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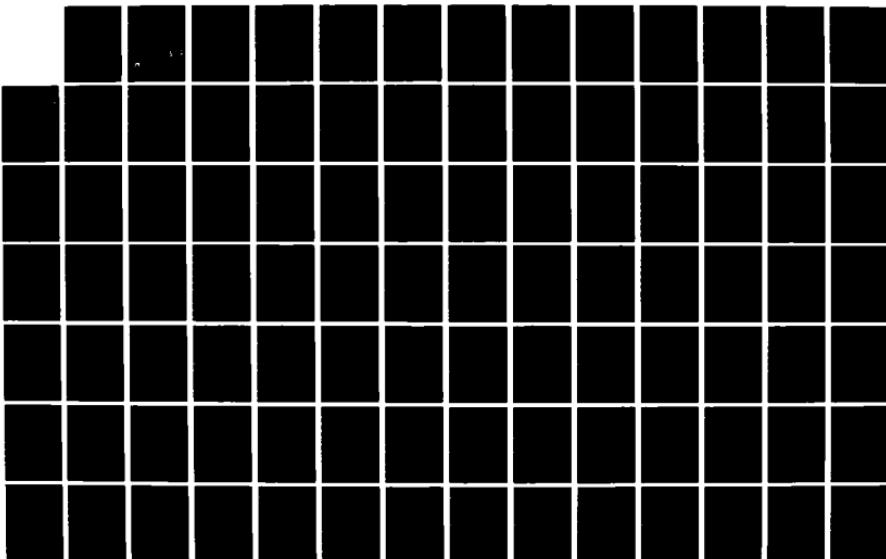
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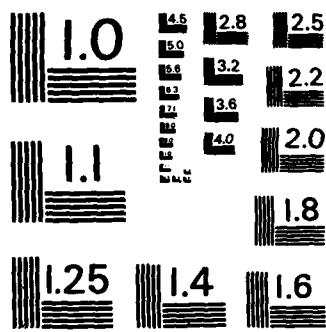
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FINAL REPORT

ANALYSIS OF FLUID FLOW  
AT  
VERY HIGH REYNOLDS NUMBER  
AROUND SMOOTH & ROUGH CIRCULAR CYLINDERS

PREPARED FOR  
OFFICE OF NAVAL RESEARCH

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ANALYSIS OF FLUID FLOW  
AT  
VERY HIGH REYNOLDS NUMBER  
AROUND SMOOTH & ROUGH CIRCULAR CYLINDERS

PREPARED BY

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and

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SUBMITTED TO

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JULY, 1985



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## ABSTRACT

This final report prepared for Contract No. N00015-83-K-0351 and is submitted to the Office of Naval Research as required by the terms of the research contract. This has been a follow up of ONR contract No. N00014-81-K-0479 the final report of which was submitted to ONR in 1983. The experimental data collected under the above referenced contract has been interpreted and analyzed through the present effort. The results of the analysis are presented in the form of several graphs sequentially identified in this document.

Part 1 of this report is the analysis of steady state pressure measurements which have been analyzed, and plotted by Alabama A&M University.

Part 2 of this report is analysis of boundary layer profiles which was conducted by Physical Research Inc.

DATA ON  
ANALYSIS OF FLUID FLOW AROUND  
ROUGH AND SMOOTH CIRCULAR CYLINDERS  
AT VERY HIGH REYNOLDS NUMBER

INTRODUCTION:

Wind tunnel tests were performed in the 12-ft pressure wind tunnel at NASA Ames Research Center during the months of May and June 1982. The model is an instrumented circular cylinder of 31.65 cm (12.46 in) diameter. Surface roughness was varied using wire mesh screens. Steady pressures, unsteady pressures, and boundary layer profiles were measured in these tests.

The data pertaining to these experiments were summarized in ONR Report Number N00014-81-K-0479. The entire data, archived in the Learning Resources Center (LRC) at Alabama A&M University, can be accessed by contacting Alabama A&M University LRC at telephone number (205) 859-7475. The collected experimental data have been analyzed during the present contract period. The task of analyzing voluminous amount of data stored on magnetic tapes by NASA was divided between Alabama A&M University and Physical Research Inc. who has been a participating subcontractor. The results of the analysis of

The steady pressure distributions have been analyzed by the prime contractor. The results of this analysis conducted by Alabama A&M University is given in Part 1 of this document. The analysis of the boundary layer profiles was conducted by Physical Research Inc, and the corresponding plots are given in Part 2.

## PART 1

### 1. Discussion of Steady Pressure Measurements

Flow past circular cylinders has been a challenging research area for the study of fundamental fluid dynamic behavior. The main parameters governing the rigid cylinder flow are the Reynolds number based on diameter, the relative surface roughness and the free stream Mach number. The various flow regimes as defined by Roshko are followed in this report. The subcritical regime is associated with the region for which  $Re$  is less than that at which minimum drag occurs. The critical regime refers to the region where the drag coefficient undergoes a sharp decrease towards the minimum. The supercritical regime is in the upper transition regime as the drag increases from its minimum value. Finally the transcritical regime is the region where the drag curve flattens out. The high Reynolds number regime that we consider in this work is the transcritical region.

The parameters of general interest for cylinder flow are the steady pressure coefficient  $C_p$ , drag coefficient  $C_D$ , unsteady lift coefficient  $C_L(t)$ , unsteady pressure coefficient  $C_p(t)$ , and the strouhal number  $S$ . In general, all of these parameters are functions of the Reynolds number  $Re$ , and relative roughness  $k/d$ . Free stream turbulence scale as well as intensity are important. Surface roughness has several interesting effects on the cylinder flow. Surface roughness affects the position of boundary layer separation and consequently the pressure coefficient on the cylinder. Roughness ahead of transition tends to move the transition forward, and roughness beneath the turbulent boundary layer changes the velocity profile. Increase in the roughness parameter  $k/d$  will modify the flow regimes by increasing the

minimum drag coefficient and by reducing the Reynolds number values which delineate the flow regimes.

The objectives of the present tests are to determine steady and unsteady flow properties on smooth and rough cylinders up to a Reynolds number of 8 million, and to investigate the Reynolds number independence regime for rough cylinders.

## 2. Experimental Arrangement and Instrumentation

The wind tunnel tests were conducted in the 12 foot pressure wind tunnel at NASA Ames Research Center during the months of May and June 1982. The operating characteristics of the wind tunnel are shown in Figure 1. The tests were conducted over a range of Reynolds numbers per foot of  $0.2 \times 10^6$  to  $7.5 \times 10^6$  at a Mach number range of 0 to 0.25, with most of the tests at M=0.24.

The model instrumented and tested is a circular cylinder with a diameter of 31.65 cm (12.46 in) machined from extra heavy, seamless "black" pipe. The ratio of surface roughness to model diameter is  $1.85 \times 10^{-6}$ . The model spanned the wind tunnel test section horizontally to obtain 2-dimensional flow. The instrumentation on the model consists of 18 static pressure ports evenly spaced at  $20^\circ$  intervals around the circumference near the middle of the cylinder as shown in Figure 2. The model is rotated at  $5^\circ$  increments through a total rotation of  $20^\circ$ . Values of static sectional drag and lift coefficients were obtained by appropriate integration of these pressure measurements. In addition to the circumferential ports in the middle there are 8 bands of static pressure ports located at sections A-1 to A-8 longitudinally. At each section, there are ports  $40^\circ$ ,  $64^\circ$  and  $124^\circ$  when the roll angle of the model is zero degrees. The pressure measurements at these

ports provide information on the two-dimensionality of the flow over the span of the cylinder.

The unsteady pressure measurements are made using 12 kulite pressure transducers evenly spaced around the circumference near the model center. The unsteady data from these transducers will be used to study lift spectra and vortex shedding frequencies as the Reynolds number is varied.

The behavior of the boundary layer as the Reynolds number is varied is studied using the boundary layer probe shown in Figure 3.

Surface roughness is simulated by the use of three square mesh wire screens. Table I gives the details of the screens.

Table I

Wire Mesh Particulars for Roughness Simulation

<u>Wire Dia (in)</u>	<u>Mesh</u>	<u>% Open</u>	<u>K/D</u>
0.0016	250	36	$3 \times 10^{-4}$
0.0065	60	37.5	$1 \times 10^{-3}$
0.063	6	38.9	$1 \times 10^{-2}$

The screens were attached in two 36 inch long end sections and one 30 inch long center section.

### 3. Experimental Results

#### (a) Static Pressure Distributions

The nature of the flow around the circular cylinder and the variation of drag and lift coefficients generated by the flow are indicated by the changes in the static pressure coefficient  $C_p$  as the angular position around the cylinder and the Reynolds number are varied. Typical  $C_p$  variations are shown in Figure 4 as the Reynolds number is varied from  $0.2 \times 10^6$  to  $7.5 \times 10^6$  for smooth cylinder.

#### (b) Comment on data

Experimental points corresponding to ports 3, 6 and 11 were exhibiting unreasonable scatter for a number of runs. These points have been selectively edited and are not shown in the pressure plots.

#### (c) Calculation of drag and lift coefficients

The drag and lift coefficients are calculated from the following relations.

$$C_D = \frac{1}{2} \int_0^{2\pi} C_p \cos \theta d\theta \quad (1)$$

$$C_L = \frac{1}{2} \int_0^{2\pi} C_p \sin \theta d\theta \quad (2)$$

The integrations in eq(1) and (2) are performed using a least squares fit to the experimental points. In other words,  $C_p$  was expressed

$$C_p = a\theta^3 + b\theta^2 + c\theta + d \quad (3)$$

and the coefficients  $a$ ,  $b$ ,  $c$ ,  $d$  were obtained from the computer program listed in appendix A. The program fits 1st degree, 2nd degree and 3rd degree curves and calculates the mean r.m.s. deviation from the experimental points. The curve that has the least r.m.s. deviation is then chosen to calculate the  $C_D$

and  $C_L$  coefficients. After several trials, it was decided to divide each  $C_p$  versus 0 curve into seven sections and compute the least square fit and  $C_L$ ,  $C_D$  values for each of the seven sections, and add them up. Typical least square fits are shown in Appendix A.

The run particulars,  $C_L$  and  $C_D$  values are displayed in the top portion for all the static pressure runs.

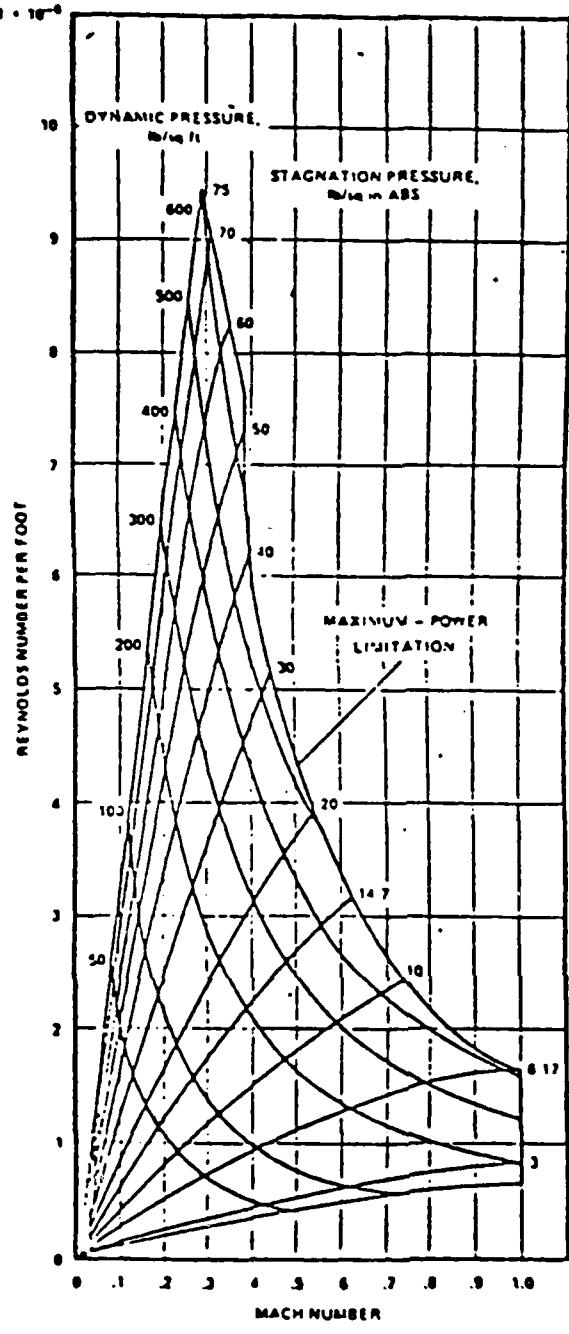


FIGURE 1. NASA TWELVE FOOT PRESSURE WIND TUNNEL OPERATING MAP

20.01 0.1712  
24.98 0.2659  
30.03 0.0574  
34.97 -0.1466  
40.14 -0.3600  
40.01 -0.3547  
44.98 -0.5599  
50.03 -0.7684

COS IS 0.12857

SIN IS -0.01105

BETA IS 0.01841

FOR DEGREE OF 2 COEFFICIENTS ARE

0.10825E 01 -0.14435E-01 -0.53343E-03

0.02 1.0822  
4.98 0.9974  
10.03 0.8840  
14.97 0.7468  
20.14 0.5754  
20.01 0.5800  
24.98 0.3890  
30.03 0.1679  
34.97 -0.0747  
40.14 -0.3564  
40.01 -0.3490  
44.98 -0.6461  
50.03 -0.9749

COS IS 0.13409

SIN IS -0.00818

BETA IS 0.00366

FOR DEGREE OF 3 COEFFICIENTS ARE

0.10035E 01 0.75950E-02 -0.17938E-02 0.16946E-04

0.02 1.0037  
4.98 1.0089  
10.03 0.9364  
14.97 0.8620  
20.14 0.6076  
20.01 0.6130  
24.93 0.3880  
30.03 0.1329  
34.97 -0.1299  
40.14 -0.4056  
40.01 -0.3988  
44.98 -0.6520  
50.03 -0.8843

COS IS 0.13506

SIN IS -0.00924

BETA IS 0.00056

```

336      SUM2=0.0
337      ENDIF
338      IF(I.EQ.2)THEN
339          SUM1=TTS
340      ENDIF
341      10 CONTINUE
C
342      ALPHA=SUM2-SUM1
343      PRINT 1
344      PRINT 66.ALPHA
345      66 FORMAT(9X,' SIN IS ',F10.5)
346      IF(J.EQ.2)THEN
347          CL3=CL3+ALPHA
348      ENDIF
349      IF(J.EQ.3)THEN
350          CL2=CL2+ALPHA
351      ENDIF
352      IF(J.EQ.4)THEN
353          CL=CL+ALPHA
354      ENDIF
355      IF(J.EQ.5)THEN
356          CL1=CL1+ALPHA
357      ENDIF
358      RETURN
359      END

```

```

/DATA
COMPILE = 0.97 SU
RUN:SEQ
94:5
-----
```

SECTION--1

X	Y
0.02	1.0178
4.98	0.9957
10.03	0.9212
14.97	0.7979
20.14	0.6117
20.01	0.6202
24.98	0.3995
30.03	0.1502
34.97	-0.1226
40.14	-0.4605
40.01	-0.4036
44.98	-0.6230
50.03	-0.8828

0.130000E 02	0.335290E 03	0.116424E 05	0.451053E 06	0.186008E 08
0.302170E 01	0.335290E 03	0.116424E 05	0.451053E 06	0.186008E 08
0.798112E 09	-0.457259E 02	0.116424E 05	0.451053E 06	0.186008E 08
0.798112E 09	0.351963E 11	-0.383072E 04	0.451053E 06	0.186008E 08
0.798112E 09	0.351963E 11	0.158392E 13	-0.204129E 06	0.186008E 08
0.798112E 09	0.351963E 11	0.158392E 13	0.724167E 14	-0.996618E 07

FOR DEGREE OF 1 COEFFICIENTS ARE

0.12974E 01 -0.41291E-01

0.02	1.2966
4.98	1.0918
10.03	0.8833
14.97	0.6793
20.14	0.4658
20.01	0.4712
24.98	0.2659
30.03	0.0574
34.97	-0.1466
40.14	-0.3600
40.01	-0.3547
44.98	-0.5599
50.03	-0.7684

COS IS 0.12857

SIN IS -0.01105

BETA IS 0.01341

```

276      ALPHA=SUM2-SUM1
277      PRINT 66,ALPHA
278      PRINT 66,ALPHA
279      66 FORMAT(9X,' COS IS ',F10.5)
280      IF(J.EQ.2)THEN
281          CE3=CE3+ALPHA
282      ENDIF
283      IF(J.EQ.3)THEN
284          CE2=CE2+ALPHA
285      ENDIF
286      IF(J.EQ.4)THEN
287          CE=CE+ALPHA
288      ENDIF
289      IF(J.EQ.5)THEN
290          CE1=CE1+ALPHA
291      ENDIF
292      RETURN
293  END

294      SUBROUTINE SINTEG(XF,XL,J,B1,CL,CL1,CL2,CL3)
295      REAL C1(100),B1(100)
296      C
297          C1(1)=B1(1)
298          DO 5 K=2,J
299              C1(K)=B1(K)*(57.3***(K-1))
300          5 CONTINUE
301          C
302              ALPHA=0.0
303              DO 10 I=1,2
304                  IF(I.EQ.1)THEN
305                      XF1=XL/57.3
306                  ELSE
307                      XF1=XF/57.3
308                  ENDIF
309
310              C
311                  T1=C1(1)*(-COS(XF1))
312                  TB1=SIN(XF1)-(XF1*COS(XF1))
313                  T2=T1+(C1(2)*TB1)
314                  IF(J.EQ.2)THEN
315                      TT5=0.5*T2
316                  ELSE
317                      TB2=(2.*XF1)*SIN(XF1)
318                      TB3=TB2+((2.-(XF1**2))*COS(XF1))
319                      T3=T2+(C1(3)*TB3)
320                  ENDIF
321                  IF(J.EQ.3)THEN
322                      TT5=0.5*T3
323                  ENDIF
324                  IF((J.NE.2).AND.(J.NE.3))THEN
325                      TB4=((3.*(XF1**2))-6.)*SIN(XF1)
326                      TB5=TB4+(((6.*XF1)-(XF1**3))*COS(XF1))
327                      T4=T3+(C1(4)*TB5)
328                  ENDIF
329                  IF(J.EQ.4)THEN
330                      TT5=0.5*T4
331                  ENDIF
332                  IF(J.EQ.5)THEN
333                      T5=((4.*(XF1**3))-(24.*XF1))*SIN(XF1)
334                      T6=((XF1**4)-(12.*XF1**2))+24.)*COS(XF1)
335                      T7=(T5-T6)*C1(5)
336                      T8=T4+T7
337                      TT5=0.5*T8
338                  ENDIF
339                  IF(I.EQ.1)THEN

```

```

210      20 CONTINUE
217      DO 40 J=2,N
218      NMJP2=N-J+2
219      NMJP1=N-J+1
220      SUM=0.0
221      DO 30 K=NJP2,N
222      SUM=SUM+A(NMJP1,K)*B(K)
223      30  CONTINUE
224      B(NMJP1)=B(NMJP1)-SUM
225      40 CONTINUE
226      RETURN
227      END

228      SUBROUTINE CINTEG(XF,XL,J,B1,CE,CE1,CE2,CE3)
229      REAL C1(100),B1(100)
230      C1(1)=B1(1)
231      DO 5 K=2,J
232      C1(K)=B1(K)*(57.3**(K-1))
233      5 CONTINUE
234      C
235      ALPHA=0.0
236      DO 10 I=1,2
237      IF(I.EQ.1)THEN
238      XF1=XL/57.3
239      ELSE
240      XF1=XF/57.3
241      ENDIF
242      C1=0.0
243      TB1=COS(XF1)+(XF1*SIN(XF1))
244      IF(J.EQ.2)THEN
245      TT5=0.5*T2
246      ELSE
247      TB2=(2.*XF1)*COS(XF1)
248      TR3=TB2+(((XF1**2)-2.)*SIN(XF1))
249      T3=T2+(C1(3)*TR3)
250      ENDIF
251      IF(J.EQ.3)THEN
252      TT5=0.5*T3
253      ENDIF
254      IF((J.NE.2).AND.(J.NE.3))THEN
255      TB4=((3.*(XF1**2))-6.)*COS(XF1)
256      TB5=TB4+((XF1**3)-(6.*XF1))*SIN(XF1)
257      T4=T3+(C1(4)*TR5)
258      ENDIF
259      IF(J.EQ.4)THEN
260      TT5=0.5*T4
261      ENDIF
262      IF(J.EQ.5)THEN
263      T5=((XF1**4)-(12.*(XF1**2))+24.)*SIN(XF1)
264      T6=((4.*(XF1**3))-(24.*XF1))*COS(XF1)
265      T7=((T5+T6)*C1(5))
266      TB=T4+T7
267      TT5=0.5*TB
268      ENDIF
269      IF(I.EQ.1)THEN
270      SUM2=TT5
271      ENDIF
272      IF(I.EQ.2)THEN
273      SUM1=TT5
274      ENDIF
275      10 CONTINUE
276      C
277      ALPHA=SUM2-SUM1
278      PRINT 11
279      PRINT 66,ALPHA
280      66 FORMAT(9X,' COS IS ',F10.5)
281      IF(J.EQ.2)THEN
282      CE3=CE3+ALPHA
283      ENDIF
284      IF(J.EQ.3)THEN
285      CE2=CE2+ALPHA
286      ENDIF
287      IF(J.EQ.4)THEN
288      CE=CE+ALPHA
289      ENDIF
290      IF(J.EQ.5)THEN
291      CE1=CE1+ALPHA
292      ENDIF

```

```

165      CP(N1)=C(L)
166      66  CONTINUE
C
C
167      DO 55 K=1,N
168          FV=CP(1)
169          DO 49 J=2,I
170              49      FV=(FV*X(K))+CP(J)
171              PRINT 1,X(K),FV
172      55  CONTINUE
173      END BLOCK
174      END
C

175      SUBROUTINE LUDCMQ(A,N,NDIM)
176      REAL A(NDIM,NDIM),SUM
177      INTEGER N,I,J,JM1,IM1,K
C
178      DO 30 I=1,N
179          DO 30 J=2,N
180              SUM=0.0
181              IF(J.LE.I)THEN
182                  JM1=J-1
183                  DO 10 K=1,JM1
184                      SUM=SUM+A(I,K)*A(K,J)
185              10  CONTINUE
186              A(I,J)=A(I,J)-SUM
187              ELSE
188                  IM1=I-1
189                  IF(IM1.NE.0)THEN
190                      DO 20 K=1,IM1
191                          SUM=SUM+A(I,K)*A(K,J)
192              20  CONTINUE
193              ENDIF
C
194      25      IF(ABS(A(I,I)).LT. 1.0E-10)THEN
195          PRINT 100,I
196          RETURN
197          ELSE
198              A(I,J)=(A(I,J)-SUM)/A(I,I)
199              ENDIF
200          ENDIF
201      30  CONTINUE
202      RETURN
C
203      100 FORMAT(' REDUCTION NOT COMPLETED BECAUSE SMALL VALUE'.
204          ' FOUND FOR DIVISION IN ROW ',I3)
205      END
C

205      SUBROUTINE SOLNQ(A,B,N,NDIM)
206      REAL A(NDIM,NDIM),B(NDIM),SUM
207      INTEGER N,I,IM1,K,J,NMJP1,NMJP2
C
C
208      B(1)=B(1)/A(1,1)
209      DO 20 I=2,N
210          IM1=I-1
211          SUM=0.0
212          DO 10 K=1,IM1
213              SUM=SUM+A(I,K)*B(K)
214          10  CONTINUE
215          B(I)=(B(I)-SUM)/A(I,I)

```

```

111      PRINT 201, ((A(J), J=1,MFF2), I=1,MFF1)
112      C
113      CALL LUOCHQ(A,MFF1,10)
114      C
115      MSP1=MSP+1
116      DO 95 I=MSP1,MFF1
117          DO 90 J=1,I
118              C(J)=A(J,MFF2)
119          90 CONTINUE
120          CALL SOLNQ(A,C,I,10)
121          IM1=I-1
122          C
123          PRINT 202,IM1,(C(J),J=1,I)
124          PRINT .
125          EXECUTE COEF
126          C
127          DO 300 K=1,I
128              B1(K)=C(K)
129              CALL CINTEG(XF,XL,I,B1,CE,CE1,CE2,CE3)
130              CALL SINTEG(XF,XL,I,B1,CL,CL1,CL2,CL3)
131          300 CONTINUE
132          C
133          PRINT .
134          BETA=0.0
135          DO 94 IPT =1,N
136              SUM=0.0
137              DO 93 ICOEF=2,I
138                  JCOEF=I-ICOEF+2
139                  SUM=(SUM+C(JCOEF))*X(IPT)
140          93 CONTINUE
141          SUM=SUM+C(1)
142          BETA=BETA+(Y(IPT)-SUM)**2
143          94 CONTINUE
144          BETA=BETA/(N-I)
145          PRINT 203,BETA
146          IF((KK.EQ.7).AND.(I.EQ.2))THEN
147              PRINT 301,CE3,CL3
148          ENDIF
149          IF((KK.EQ.7).AND.(I.EQ.3))THEN
150              PRINT 301,CE2,CL2
151          ENDIF
152          IF((KK.EQ.7).AND.(I.EQ.4))THEN
153              PRINT 301,CE,CL
154          301 FORMAT(//45X,' CD =',F10.5//,45X,' CL =',F10.5)
155          ENDIF
156          IF((KK.EQ.7).AND.(I.EQ.5))THEN
157              PRINT 301,CE1,CL1
158          ENDIF
159          95 CONTINUE
160          C
161          999 CONTINUE
162          C
163          200 FORMAT(///' DEGREE OF POLYNOMIAL CANNOT EXCEED N - 1.'/
164              | ' REQUESTED MAXIMUM DEGREE TOO LARGE - '.
165              | 'REDUCED TO ',I3)
166          201 FORMAT(5(3X,E13.6))
167          202 FORMAT('/' FOR DEGREE OF ',I2,' COEFFICIENTS ARE'//
168              | ',5X,6(2X,E12.5))
169          203 FORMAT(9X,' BETA IS ',F10.5//)
170          PRINT 299,ISEQ
171          299 FORMAT(////////.35X,'END OF RUN:SEQ ',5A1////)
172          STOP
173          C
174          REMOTE RBLOCK COEF
175          DO 66 L=1,I
176              N1=I-L+1
177              CP(N1)=C(L)
178          66 CONTINUE
179          C
180          DO 55 K=1,N
181              FV=CP(1)
182              DO 49 J=2,I
183                  49   FV=(FV*X(K))+CP(J)
184                  PRINT 1,X(K),FV
185          55 CONTINUE
186          END RBLOCK
187          END
188          C

```

```

54      TEMP1=X(N)
55      TEMP2=Y(N)
56      ENDIF
57      IF(KK.NE.1)THEN
58          X(1)=TEMP1
59          Y(1)=TEMP2
60          DO 4 I=2,N
61          READ ,K1,Y(I),K2,X(I)
62          TEMP1=X(N)
63          TEMP2=Y(N)
64      ENDIF
C
65      PRINT 1,(X(I),Y(I),I=1,N)
66      1 FORMAT(2X,F6.2,2X,F8.4)
C
67      IF(KK.EQ.1)THEN
68          XF=0.0
69          XL=X(N)
70      ELSE
71          XF=X(1)
72          XL=X(N)
73      ENDIF
C
74      IF(KK.EQ.7)THEN
75          XF=X(1)
76          XL=360.
77      ELSE
78          XL=X(N)
79      ENDIF
C
C
C
C
80      READ , MS, MF
C
81      IF(MF.GT.(N-1))THEN
82          MF=N-1
83          PRINT 200,MF
84      ENDIF
85      5 MFP1=MF+1
86      MFP2=MF+2
C
86      DO 10 I=1,N
87          XN(I)=1.0
88      10 CONTINUE
C
89      DO 30 I=1,MFP1
90          A(I,1)=0.0
91          A(I,MFP2)=0.0
92          DO 20 J=1,N
93              A(I,1)=A(I,1)+XN(J)
94              A(I,MFP2)=A(I,MFP2)+Y(J)*XN(J)
95              XN(J)=XN(J)*X(J)
96          20 CONTINUE
97      30 CONTINUE
C
98      DO 50 I=2,MFP1
99          A(MFP1,I)=0.0
100         DO 40 J=1,N
101             A(MFP1,I)=A(MFP1,I)+XN(J)
102             XN(J)=XN(J)*X(J)
103         40 CONTINUE
104     50 CONTINUE
C
105        DO 70 J=2,MFP1
106            DO 60 I=1, MF
107                A(I,J)=A(I+1,J-1)
108            60 CONTINUE
109        70 CONTINUE
C

```

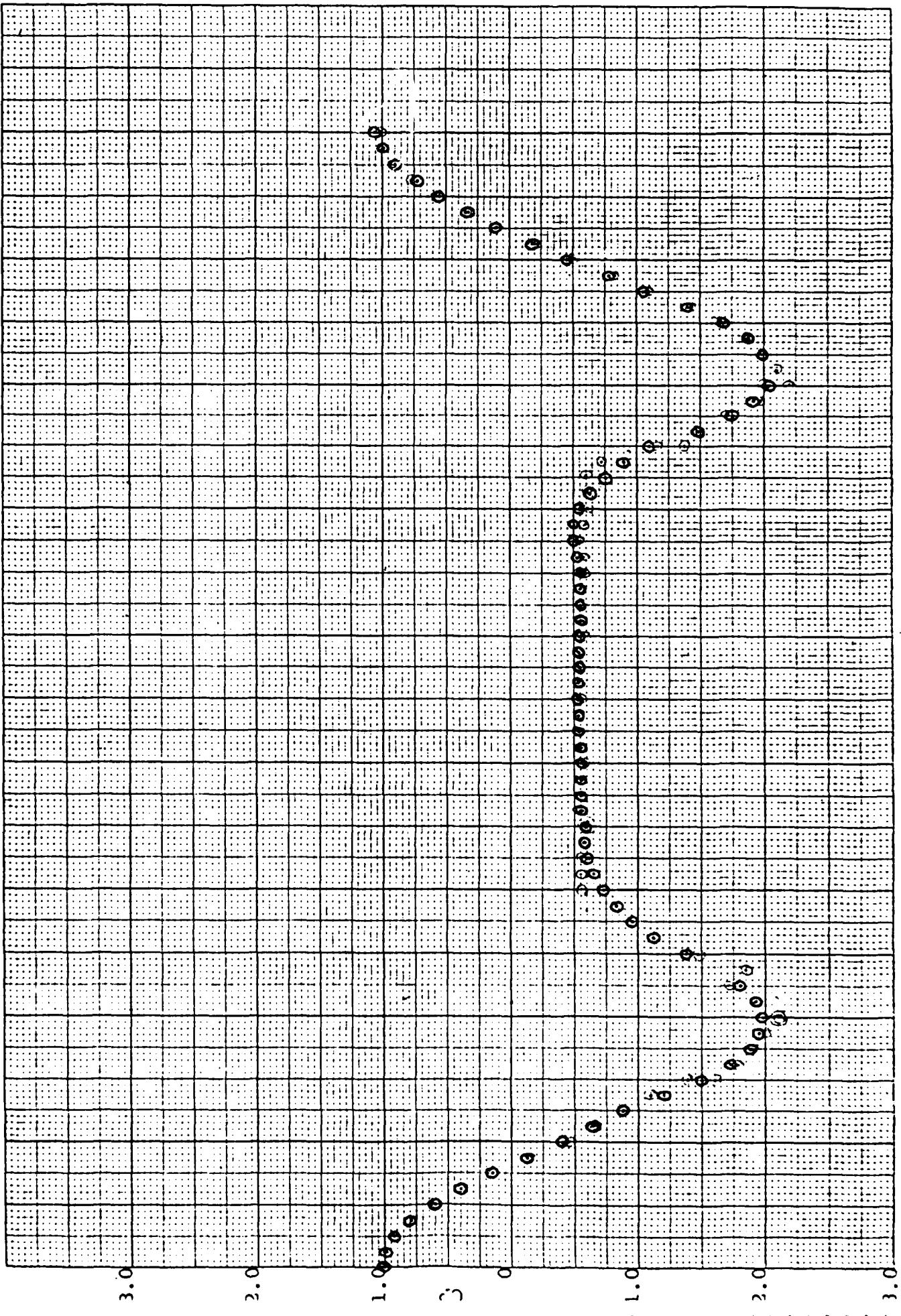
```

2      REAL X(100),Y(100),C(100),B1(100),A(10,11),XN(100),SUM,BETA
3      REAL CP(100),FV
4      INTEGER N,MS,MF,MFP1,MFP2,I,J,IM1,IFT,ICOEF,JCDEF
5      C      CHARACTER*5 ISEQ
6      C      DATA MS/1/,MF/4/
7      C
8      PRINT *, 'RUN:SEQ'
9      READ 11,ISEQ
10     11 FORMAT(5A1)
11     PRINT 11,ISEQ
12     PRINT *,'-----'
13     C
14     CE=0.0
15     CL=0.0
16     CE1=0.0
17     CL1=0.0
18     CE2=0.0
19     CL2=0.0
20     CE3=0.0
21     CL3=0.0
22     DO 999 KK=1,7
23     PRINT 33
24     33 FORMAT('0')
25     IF(KK.EQ.1)THEN
26       PRINT *, 'SECTION--1'
27       N=13
28     ENDIF
29     C
30     IF(KK.EQ.2)THEN
31       PRINT *, 'SECTION--2'
32       N=12
33     ENDIF
34     C
35     IF(KK.EQ.3)THEN
36       PRINT *, 'SECTION--3'
37       N=14
38     ENDIF
39     C
40     IF(KK.EQ.4)THEN
41       PRINT *, 'SECTION--4'
42       N=21
43     ENDIF
44     C
45     IF(KK.EQ.5)THEN
46       PRINT *, 'SECTION--5'
47       N=12
48     ENDIF
49     C
50     IF(KK.EQ.6)THEN
51       PRINT *, 'SECTION--6'
52       N=11
53     ENDIF
54     C
55     IF(KK.EQ.7)THEN
56       PRINT *, 'SECTION-7'
57       N=13
58     ENDIF
59     C
60     PRINT *, ' X          Y'
61     IF(KK.EQ.1)THEN
62       DO 3 I=1,N
63       3   READ , K1,Y(I),K2,X(I)
64       TEMP1=X(N)
65       TEMP2=Y(N)
66     ENDIF
67     IF(KK.NE.1)THEN
68       X(1)=TEMP1
69       Y(1)=TEMP2
70       DO 4 I=2,N
71       4   READ , K1,Y(I),K2,X(I)
72       TEMP1=X(N)
73       TEMP2=Y(N)
74     ENDIF
75     C
76     PRINT 1,(X(I),Y(I),I=1,N)
77     1 FORMAT(2X,F6.2,2X,F8.4)
78     C
79     IF(KK.EQ.1)THEN
80       XF=0.0
81       XL=1.0
82     ELSE

```

RUN NO: 614

INITIALS: W.C.



NO. 340-20 DIEZEN GRAPH PAPER  
20 X 20 PER INCH

LUDWIG DILTZEN CO.  
MADE IN U. S. A.

APPENDIX A  
EXAMPLES OF  
LEAST SQUARE FIT COMPUTER PROGRAM  
RESULTS AND PLOTS

## REFERENCES

1. M. C. George, High Reynolds Number Cylinder Flow Studies, Dept. of Physics, Alabama A&M University, Normal, AL, 1982.
2. W. C. L. Shih, High Reynolds Number Cylinder Flow Workshop, Final Report, 17 August 1981, PRi-LA-81-R003, Physical Research Inc.
3. W. C. L. Shih, High Reynolds Number Cylinder Flow Tests Pretest Report, 20 April 1982, PRi-LA-82-R001, Physical Research Inc.
4. A. Roshko, Experiments on Flow Past a Circular Cylinder at Very High Reynolds Numbers, J. Fluid Mechanics, Vol. 10, pp. 345-356, 1961.

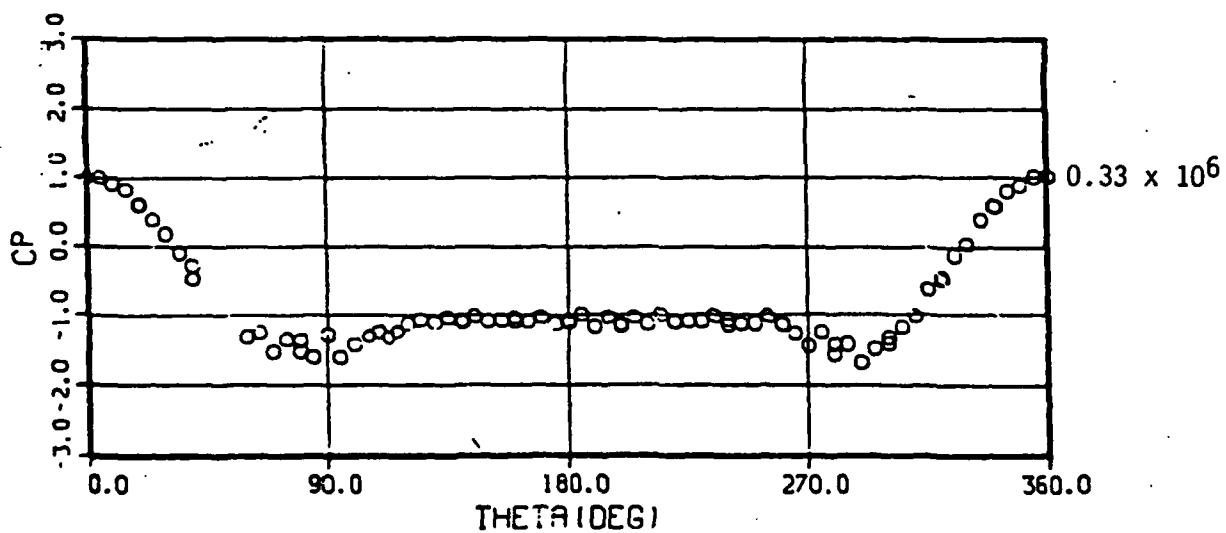
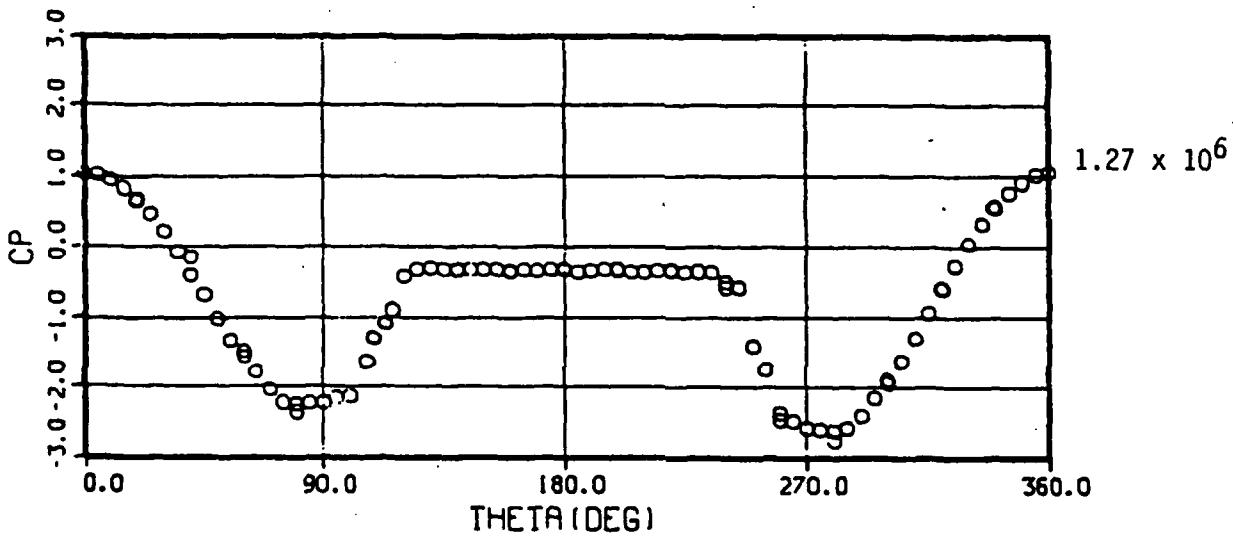
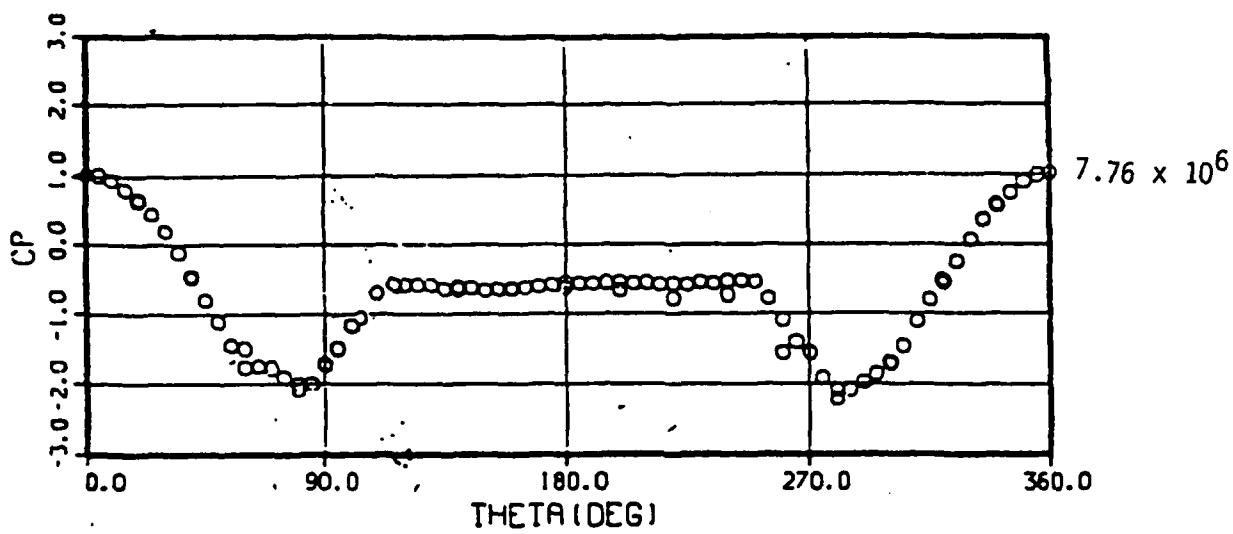


Figure 4. Typical changes in the pressure distribution over the smooth cylinder as Reynolds number is varied.

Assembled Unit

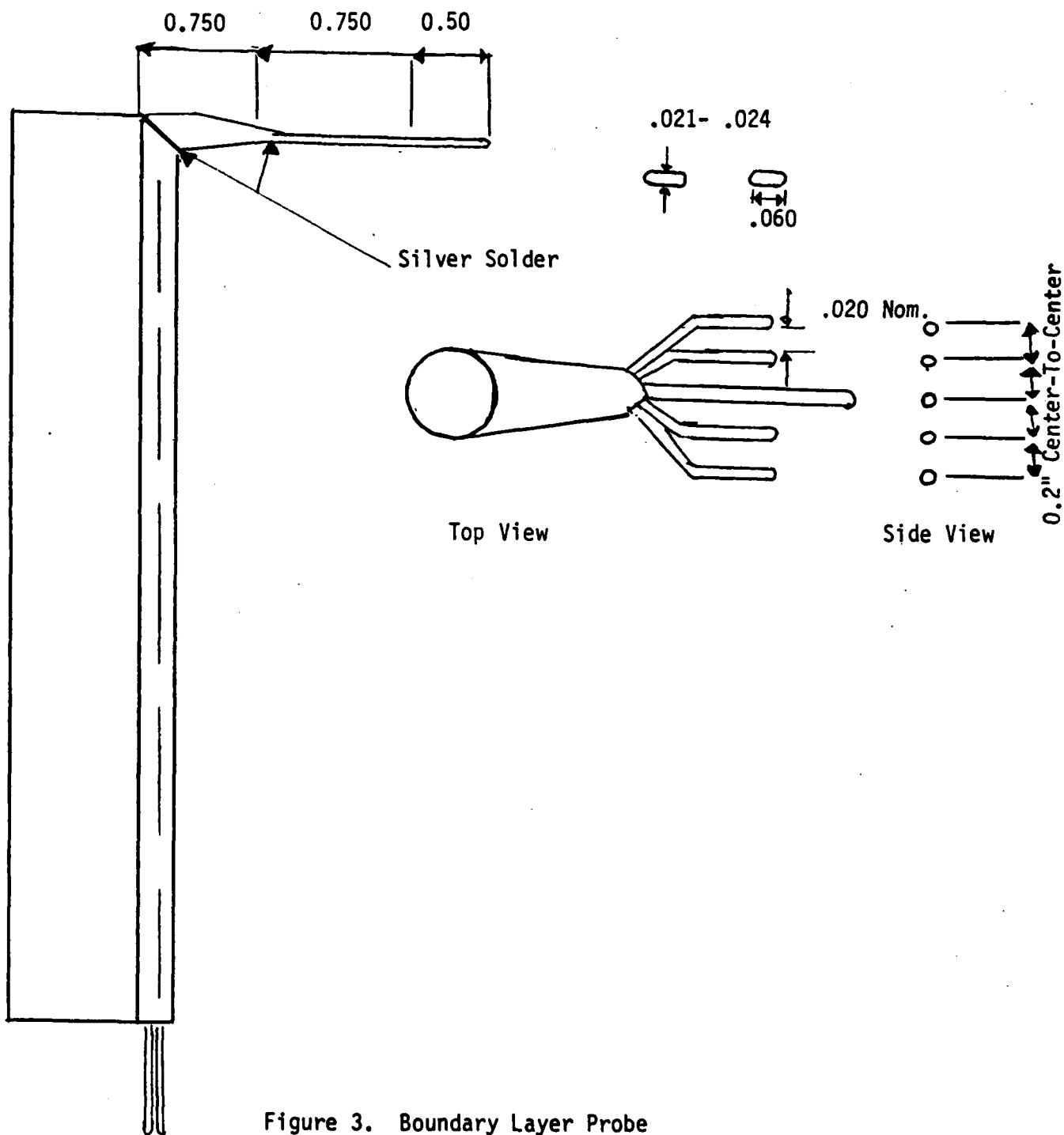
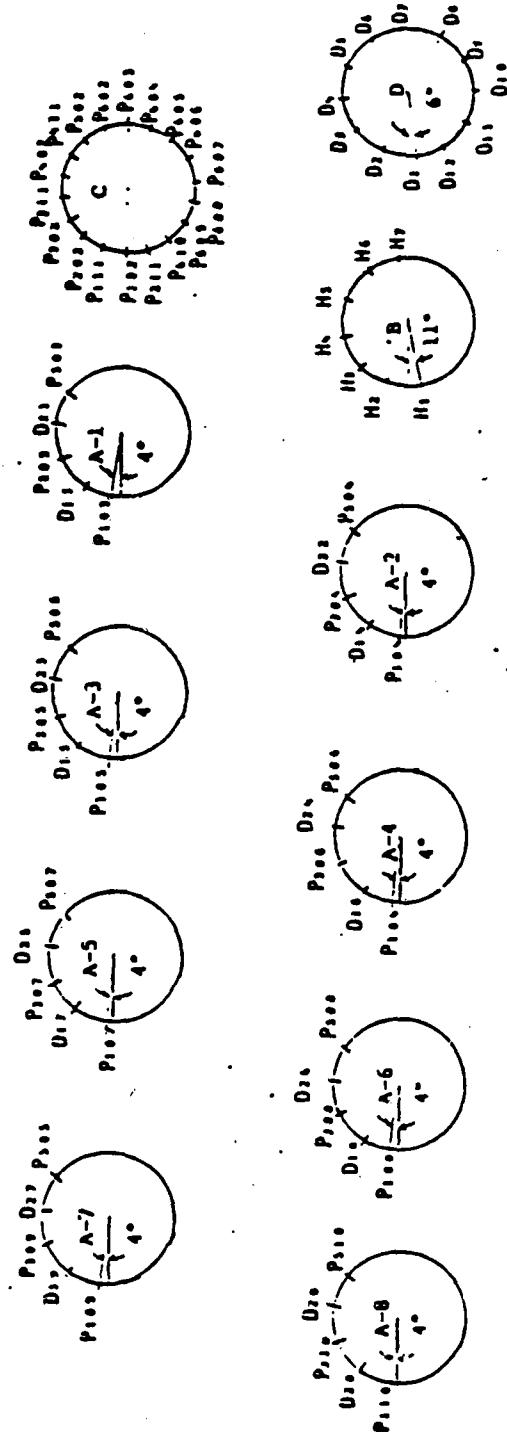
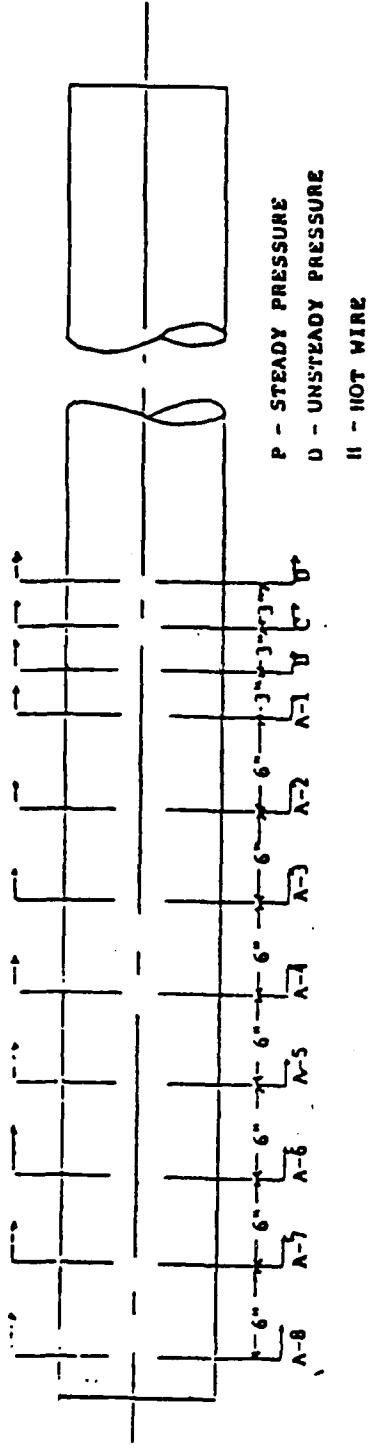


Figure 3. Boundary Layer Probe



SECTION C: ORIFICES LOCATED 20° APART

FIGURE 2. Model Instrumentation at 0 Degrees Roll Angle

FOR DEGREE OF 4 COEFFICIENTS ARE

0.10168E 01 0.84769E-03 -0.95523E-03 -0.91413E-05 0.25605E-06

0.02 1.0169  
4.98 0.9964  
10.03 0.9226  
14.97 0.7977  
20.14 0.6139  
20.01 0.6191  
24.98 0.3992  
30.03 0.1416  
34.97 -0.1297  
40.14 -0.4147  
40.01 -0.4077  
44.98 -0.6614  
50.03 -0.8722

COS IS 0.13440

SIN IS -0.00937

BETA IS 0.00048

SECTION--2

X Y  
50.03 -0.8828  
54.97 -1.1068  
60.14 -1.3975  
60.01 -1.6055  
64.98 -1.7802  
70.03 -1.9043  
74.97 -1.9986  
80.14 -1.9990  
84.98 -1.9226  
90.03 -1.7120  
100.14 -1.4689  
100.01 -1.3358

0.120000E 02 0.890429E 03 0.692692E 05 0.562675E 07 0.474613E 09  
-0.191140E 02 0.890429E 03 0.692692E 05 0.562675E 07 0.474613E 09  
0.413187E 11 -0.144267E 04 0.692692E 05 0.562675E 07 0.474613E 09  
0.413187E 11 0.369112E 13 -0.113169E 06 0.562675E 07 0.474613E 09  
0.413187E 11 0.369112E 13 0.336642E 15 -0.919925E 07 0.474613E 09  
0.413187E 11 0.369112E 13 0.336642E 15 0.312140E 17 -0.771955E 09

FOR DEGREE OF 1 COEFFICIENTS ARE

-0.10273E 01 -0.76215E-02

50.03 -1.4086  
54.97 -1.4463  
60.14 -1.4857  
60.01 -1.4847  
64.98 -1.5225  
70.03 -1.5610  
74.97 -1.5987  
80.14 -1.6381  
84.98 -1.6750  
90.03 -1.7135  
100.14 -1.7985  
100.01 -1.7895

COS IS -0.16322

SIN IS -0.65558

BETA IS 0.12591

FOR DEGREE OF 2 COEFFICIENTS ARE

0.65178E 01 -0.21553E 00 0.13655E-02

50.03 -0.8473  
54.97 -1.2038  
60.14 -1.5054  
60.01 -1.4987  
64.98 -1.7217  
70.03 -1.8791  
74.97 -1.9657  
80.14 -1.9850  
84.98 -1.9369  
90.03 -1.8185  
100.14 -1.3722  
100.01 -1.3797

COS IS -0.16853

SIN IS -0.69364

BETA IS 0.00687

100.14 -1.77905  
100.01 -1.7895

COS IS -0.16322  
SIN IS -0.65558  
BETA IS 0.12591

FOR DEGREE OF 2 COEFFICIENTS ARE

0.65178E 01 -0.21553E 00 0.13655E-02

50.03 -0.8473  
54.97 -1.2038  
60.14 -1.5054  
60.01 -1.4987  
64.98 -1.7217  
70.03 -1.8791  
74.97 -1.9657  
80.14 -1.9850  
84.98 -1.9369  
90.03 -1.8185  
100.14 -1.3722  
100.01 -1.3797

COS IS -0.16853  
SIN IS -0.69364  
BETA IS 0.00687

FOR DEGREE OF 3 COEFFICIENTS ARE

0.78889E 01 -0.27302E 00 0.21461E-02 -0.34363E-05

50.03 -0.8289  
54.97 -1.2049  
60.14 -1.5159  
60.01 -1.5090  
64.98 -1.7330  
70.03 -1.8859  
74.97 -1.9651  
80.14 -1.9764  
84.98 -1.9228  
90.03 -1.8036  
100.14 -1.3809  
100.01 -1.3878

COS IS -0.16879  
SIN IS -0.69263  
BETA IS 0.00736

FOR DEGREE OF 4 COEFFICIENTS ARE

0.13080E 02 -0.57381E 00 0.85424E-02 -0.62585E-04 0.20077E-06

50.03 -0.8257

100.01 -1.3841  
104.98 -1.2371  
105.98 -1.0010  
109.02 -0.7490  
110.03 -1.1297  
112.02 -0.5890  
114.97 -1.2055  
120.14 -1.0330  
120.01 -0.5638  
124.98 -0.5517  
130.03 -0.5475  
134.97 -0.5694  
140.14 -0.5971  
140.01 -0.5796

COS IS -0.16862  
SIN IS -0.69372  
BETA IS 0.00951

SECTION--3

X Y  
100.01 -1.3358  
104.98 -1.2371  
105.98 -1.0010  
109.02 -0.7490  
110.03 -1.1297  
112.02 -0.5890  
114.97 -1.2055  
120.14 -1.0330  
120.01 -0.5638  
124.98 -0.5517  
130.03 -0.5475  
134.97 -0.5694  
140.14 -0.5971  
140.01 -0.5796

0.140000E 02 0.166729E 04 0.200835E 06 0.244695E 08 0.301510E 10  
-0.116892E 02 0.166729E 04 0.200835E 06 0.244695E 08 0.301510E 10  
0.375610E 12 -0.135367E 04 0.200835E 06 0.244695E 08 0.301510E 10  
0.375610E 12 0.472867E 14 -0.158507E 06 0.244695E 08 0.301510E 10  
0.375610E 12 0.472867E 14 0.601262E 16 -0.187749E 08 0.301510E 10  
0.375610E 12 0.472867E 14 0.601262E 16 0.771667E 18 -0.225018E 10

FOR DEGREE OF 1 COEFFICIENTS ARE

-0.28464E 01 0.16890E-01

100.01 -1.1572  
104.98 -1.0733  
105.98 -1.0564  
109.02 -1.0051  
110.03 -0.9880  
112.02 -0.9544  
114.97 -0.9046  
120.14 -0.8172  
120.01 -0.8194  
124.98 -0.7355  
130.03 -0.6502  
134.97 -0.5668  
140.14 -0.4794  
140.01 -0.4816

COS IS 0.12839  
SIN IS -0.24947  
BETA IS 0.04593

FOR DEGREE OF 2 COEFFICIENTS ARE

-0.10564E 02 0.14565E 00 -0.53097E-03

100.01 -1.3081  
104.98 -1.1252  
105.98 -1.0915  
109.02 -0.9958  
110.03 -0.9661  
112.02 -0.9109  
114.97 -0.8368  
120.14 -0.7291  
120.01 -0.7315  
124.98 -0.6541  
130.03 -0.6023  
134.97 -0.5779  
140.14 -0.5801  
140.01 -0.5797

COS IS 0.12434  
SIN IS -0.24450  
BETA IS 0.04391

FOR DEGREE OF 3 COEFFICIENTS ARE

SIN IS 0.24947

BETA IS 0.04593

FOR DEGREE OF 2 COEFFICIENTS ARE

-0.10564E 02 0.14565E 00 -0.53097E-03

100.01 -1.3081  
104.98 -1.1252  
105.98 -1.0915  
109.02 -0.9958  
110.03 -0.9661  
112.02 -0.9109  
114.97 -0.8368  
120.14 -0.7291  
120.01 -0.7315  
124.98 -0.6541  
130.03 -0.6023  
134.97 -0.5779  
140.14 -0.5801  
140.01 -0.5797

COS IS 0.12434

SIN IS -0.24458

BETA IS 0.04391

FOR DEGREE OF 3 COEFFICIENTS ARE

-0.39924E 01 -0.14355E-01 0.75819E-03 -0.34382E-05

100.01 -1.2840  
104.98 -1.1215  
105.98 -1.0907  
109.02 -1.0012  
110.03 -0.9729  
112.02 -0.9194  
114.97 -0.8461  
120.14 -0.7357  
120.01 -0.7382  
124.98 -0.6557  
130.03 -0.5988  
134.97 -0.5718  
140.14 -0.5768  
140.01 -0.5762

COS IS 0.12432

SIN IS -0.24459

BETA IS 0.04833

FOR DEGREE OF 4 COEFFICIENTS ARE

-0.28856E 01 -0.52032E-02 0.50180E-04 0.38284E-05 -0.22013E-07

100.01 -1.2768  
104.98 -1.1232  
105.98 -1.0907

100.00 -1.00734  
109.02 -1.00553  
110.03 -0.99773  
112.02 -0.9236  
114.97 -0.8487  
120.14 -0.7338  
120.01 -0.7364  
124.98 -0.6492  
130.03 -0.5900  
134.97 -0.5660  
140.14 -0.5831  
140.01 -0.5821

COS IS 0.12385

SIN IS -0.24411

BETA IS 0.05379

SECTION--4

X Y  
140.01 -0.5796  
144.98 -0.5646  
150.03 -0.5444  
154.97 -0.5629  
160.14 -0.5654  
160.01 -0.5568  
164.98 -0.5363  
170.03 -0.5312  
174.97 -0.5278  
180.14 -0.5394  
180.01 -0.5227  
184.98 -0.5301  
190.03 -0.5312  
194.97 -0.5341  
200.14 -0.5738  
200.01 -0.5173  
204.98 -0.5707  
210.03 -0.5545  
214.97 -0.5622  
220.14 -0.5778  
220.01 -0.5343

0.210000E 02 0.382053E 04 0.707601E 06 0.133286E 09 0.255026E 11  
-0.115171E 02 0.382053E 04 0.707601E 06 0.133286E 09 0.255026E 11  
0.494994E 13 -0.209444E 04 0.707601E 06 0.133286E 09 0.255026E 11  
0.494994E 13 0.973240E 15 -0.387896E 06 0.133286E 09 0.255026E 11  
0.494994E 13 0.973240E 15 0.193572E 18 -0.730862E 08 0.255026E 11  
0.494994E 13 0.973240E 15 0.193572E 18 0.388954E 20 -0.139919E 11

FOR DEGREE OF 1 COEFFICIENTS ARE

-0.56089E 00 0.68452E-04

140.01 -0.5513  
144.98 -0.5510  
150.03 -0.5506  
154.97 -0.5503  
160.14 -0.5499  
160.01 -0.5499  
164.98 -0.5496  
170.03 -0.5492  
174.97 -0.5489  
180.14 -0.5486  
180.01 -0.5486  
184.98 -0.5482  
190.03 -0.5479  
194.97 -0.5475  
200.14 -0.5472  
200.01 -0.5472  
204.98 -0.5469  
210.03 -0.5465  
214.97 -0.5462  
220.14 -0.5458  
220.01 -0.5458

COS IS 0.35259

SIN IS -0.00044

BETA IS 0.00040

FOR DEGREE OF 2 COEFFICIENTS ARE

-0.12688E 01 0.80077E-02 -0.21057E-04

140.01 -0.5761  
144.98 -0.5673  
150.03 -0.5594  
154.97 -0.5528  
160.14 -0.5470  
160.01 -0.5471  
164.98 -0.5426  
170.03 -0.5391  
174.97 -0.5368

174.97 -0.5489  
180.14 -0.5486  
180.01 -0.5486  
184.98 -0.5482  
190.03 -0.5479  
194.97 -0.5475  
200.14 -0.5472  
200.01 -0.5472  
204.98 -0.5469  
210.03 -0.5465  
214.97 -0.5462  
220.14 -0.5458  
220.01 -0.5458

COS IS 0.35259  
SIN IS -0.00044  
BETA IS 0.00040

FOR DEGREE OF 2 COEFFICIENTS ARE

-0.12688E 01 0.80077E-02 -0.21857E-04

140.01 -0.5761  
144.98 -0.5673  
150.03 -0.5594  
154.97 -0.5528  
160.14 -0.5470  
160.01 -0.5471  
164.98 -0.5426  
170.03 -0.5391  
174.97 -0.5368  
180.14 -0.5356  
180.01 -0.5356  
184.98 -0.5354  
190.03 -0.5364  
194.97 -0.5384  
200.14 -0.5413  
200.01 -0.5415  
204.98 -0.5457  
210.03 -0.5511  
214.97 -0.5574  
220.14 -0.5652  
220.01 -0.5650

COS IS 0.35122  
SIN IS -0.00088  
BETA IS 0.00026

FOR DEGREE OF 3 COEFFICIENTS ARE

-0.13458E 01 0.93171E-02 -0.29193E-04 0.13547E-07

140.01 -0.5764  
144.98 -0.5673  
150.03 -0.5593  
154.97 -0.5526  
160.14 -0.5468  
160.01 -0.5469  
164.98 -0.5424

170.01 -0.5356  
174.97 -0.5368  
180.01 -0.5356  
180.01 -0.5356  
184.98 -0.5355  
190.03 -0.5365  
194.97 -0.5386  
200.14 -0.5418  
200.01 -0.5417  
204.98 -0.5459  
210.03 -0.5512  
214.97 -0.5574  
220.14 -0.5650  
220.01 -0.5648

COS IS 0.35123

SIN IS -0.00087

BETA IS 0.00027

FOR DEGREE OF 4 COEFFICIENTS ARE

-0.10692E 01 -0.35781E-02 0.13497E-03 -0.79924E-06 0.13970E-08

140.01 -0.5811  
144.98 -0.5693  
150.03 -0.5592  
154.97 -0.5510  
160.14 -0.5444  
160.01 -0.5445  
164.98 -0.5398  
170.03 -0.5366  
174.97 -0.5350  
180.14 -0.5348  
180.01 -0.5348  
184.98 -0.5358  
190.03 -0.5379  
194.97 -0.5409  
200.14 -0.5448  
200.01 -0.5446  
204.98 -0.5488  
210.03 -0.5532  
214.97 -0.5575  
220.14 -0.5616  
220.01 -0.5615

COS IS 0.35132

SIN IS -0.00071

BETA IS 0.00028

SECTION--5

X	Y
220.01	-0.5343
224.98	-0.5707
230.03	-0.5639
234.97	-0.5809
240.14	-0.6122
240.01	-0.5467
244.98	-0.6059
250.03	-0.5981
254.97	-0.7184
258.98	-0.9475
260.14	-1.3848
260.01	-1.1545

0.120000E 02	0.291925E 04	0.712305E 06	0.174317E 09	0.427816E 11
-0.881790E 01	0.291925E 04	0.712305E 06	0.174317E 09	0.427816E 11
0.105290E 14	-0.217733E 04	0.712305E 06	0.174317E 09	0.427816E 11
0.105290E 14	0.259830E 16	-0.539224E 06	0.174317E 09	0.427816E 11
0.105290E 14	0.259830E 16	0.642874E 18	-0.133920E 09	0.427016E 11
0.105290E 14	0.259830E 16	0.642874E 18	0.159460E 21	-0.333502E 11

FOR DEGREE OF 1 COEFFICIENTS ARE

0.29297E 01 -0.15064E-01

220.01	-0.3844
224.98	-0.4593
230.03	-0.5354
234.97	-0.6098
240.14	-0.6877
240.01	-0.6857
244.98	-0.7606
250.03	-0.8366
254.97	-0.9111
258.98	-0.9715
260.14	-0.9889
260.01	-0.9870

COS IS 0.10682

SIN IS 0.20912

244.98 -0.6059  
250.03 -0.5981  
254.97 -0.7104  
258.98 -0.9475  
260.14 -1.3848  
260.01 -1.1545

0.120000E 02 0.291925E 04 0.712305E 06 0.174317E 09 0.427816E 11  
-0.881798E 01 0.291925E 04 0.712305E 06 0.174317E 09 0.427816E 11  
0.105290E 14 -0.217733E 04 0.712305E 06 0.174317E 09 0.427816E 11  
0.105290E 14 0.259830E 16 -0.539224E 06 0.174317E 09 0.427816E 11  
0.105290E 14 0.259030E 16 0.642874E 18 -0.133920E 09 0.427816E 11  
0.105290E 14 0.259830E 16 0.642874E 18 0.159460E 21 -0.333502E 11

FOR DEGREE OF 1 COEFFICIENTS ARE

0.29297E 01 -0.15064E-01

220.01 -0.3844  
224.98 -0.4593  
230.03 -0.5354  
234.97 -0.6098  
240.14 -0.6877  
240.01 -0.6857  
244.98 -0.7606  
250.03 -0.8366  
254.97 -0.9111  
258.98 -0.9715  
260.14 -0.9889  
260.01 -0.9870

COS IS 0.10682

SIN IS 0.20912

BETA IS 0.03648

FOR DEGREE OF 2 COEFFICIENTS ARE

-0.39123E 02 0.33391E 00 -0.72174E-03

220.01 -0.5955  
224.98 -0.5322  
230.03 -0.5044  
234.97 -0.5128  
240.14 -0.5593  
240.01 -0.5577  
244.98 -0.6379  
250.03 -0.7558  
254.97 -0.9069  
258.98 -1.0554  
260.14 -1.1027  
260.01 -1.0973

COS IS 0.10285

SIN IS 0.19823

BETA IS 0.01914

FOR DEGREE OF 3 COEFFICIENTS ARE

220.01 -0.6782  
224.98 -0.5530  
230.03 -0.5043  
234.97 -0.4958  
240.14 -0.5307  
240.01 -0.5292  
244.98 -0.6066  
250.03 -0.7307  
254.97 -0.9004  
258.98 -1.0744  
260.14 -1.1310  
260.01 -1.1245

COS IS 0.10216

SIN IS 0.19562

BETA IS 0.02013

FOR DEGREE OF 4 COEFFICIENTS ARE

-0.85208E 01 -0.16731E-01 0.33092E-03 0.61200E-06 -0.46778E-08

220.01 -0.6264  
224.98 -0.5503  
230.03 -0.5073  
234.97 -0.5014  
240.14 -0.5363  
240.01 -0.5349  
244.98 -0.6100  
250.03 -0.7321  
254.97 -0.8991  
258.98 -1.0713  
260.14 -1.1275  
260.01 -1.1211

COS IS 0.10232

SIN IS 0.19599

BETA IS 0.02251

SECTION--6

X Y  
260.01 -1.1545  
264.98 -1.5054  
270.03 -1.7206  
274.97 -1.9735  
280.01 -2.0539  
290.03 -1.9826  
294.97 -1.8565  
300.14 -1.6905  
300.01 -1.6266  
304.98 -1.4154  
310.03 -1.0917

0.110000E 02 0.315016E 04 0.905096E 06 0.260886E 09 0.754336E 11  
-0.180712E 02 0.315016E 04 0.905096E 06 0.260886E 09 0.754336E 11  
0.218777E 14 -0.516959E 04 0.905096E 06 0.260886E 09 0.754336E 11  
0.218777E 14 0.636378E 16 -0.140303E 07 0.260886E 09 0.754336E 11  
0.210777E 14 0.636378E 16 0.185636E 19 -0.426629E 09 0.754336E 11  
0.218777E 14 0.636378E 16 0.185636E 19 0.542992E 21 -0.123064E 12

FOR DEGREE OF 1 COEFFICIENTS ARE

-0.21847E 01 0.18920E-02

260.01 -1.6927  
264.98 -1.6833  
270.03 -1.6738  
274.97 -1.6644  
280.01 -1.6549  
290.03 -1.6359  
294.97 -1.6266  
300.14 -1.6168  
300.01 -1.6170  
304.98 -1.6076  
310.03 -1.5981

COS IS -0.17717

SIN IS 0.67265

BETA IS 0.11669

FOR DEGREE OF 2 COEFFICIENTS ARE

0.12129E 03 -0.86767E 00 0.15259E-02

260.01 -1.1581  
264.98 -1.4891  
270.03 -1.7482

0.218777E 14 0.636378E 16 -0.148303E 07 0.260886E 09 0.754334E 11  
0.218777E 14 0.636378E 16 0.185636E 19 -0.42629E 09 0.754334E 11  
0.218777E 14 0.636378E 16 0.185636E 19 0.542992E 21 -0.123064E 12

FOR DEGREE OF 1 COEFFICIENTS ARE

-0.21847E 01 0.18920E-02

260.01 -1.6927  
264.98 -1.6833  
270.03 -1.6738  
274.97 -1.6644  
280.01 -1.6549  
290.03 -1.6359  
294.97 -1.6266  
300.14 -1.6168  
300.01 -1.6170  
304.98 -1.6076  
310.03 -1.5981

COS IS -0.17717

SIN IS 0.67265

BETA IS 0.11669

FOR DEGREE OF 2 COEFFICIENTS ARE

0.12129E 03 -0.86767E 00 0.15259E-02

260.01 -1.1581  
264.98 -1.4891  
270.03 -1.7482  
274.97 -1.9263  
280.01 -2.0313  
290.03 -2.0099  
294.97 -1.8865  
300.14 -1.6777  
300.01 -1.6839  
304.98 -1.4082  
310.03 -1.0509

COS IS -0.18811

SIN IS 0.71507

BETA IS 0.00132

FOR DEGREE OF 3 COEFFICIENTS ARE

0.86534E 02 -0.49445E 00 0.19226E-03 0.15855E-05

260.01 -1.1599  
264.98 -1.4867  
270.03 -1.7453  
274.97 -1.9254  
280.01 -2.0337  
290.03 -2.0178  
294.97 -1.8944  
300.14 -1.6819  
300.01 -1.6883  
304.98 -1.4045

COS IS -0.18827  
SIN IS 0.71557  
BETA IS 0.00198

FOR DEGREE OF 4 COEFFICIENTS ARE

0.83888E 02 -0.53460E 00 0.81080E-03 -0.80930E-06 0.29233E-08

260.01 -1.1637  
264.98 -1.4854  
270.03 -1.7414  
274.97 -1.9211  
280.01 -2.0305  
290.03 -2.0189  
294.97 -1.8972  
300.14 -1.6850  
300.01 -1.6914  
304.98 -1.4059  
310.03 -1.0297

COS IS -0.18833  
SIN IS 0.71528  
BETA IS 0.00256

SECTION-7

X Y  
310.03 -1.0917  
314.97 -0.8182  
320.14 -0.5099  
320.01 -0.4734  
324.98 -0.2023  
330.03 0.1129  
334.97 0.3500  
340.14 0.5774  
340.01 0.5977  
344.98 0.7671  
350.03 0.9074  
354.97 0.9903  
360.14 1.0239

0.130000E 02 0.434540E 04 0.145549E 07 0.488522E 09 0.164303E 12  
0.223120E 01 0.434540E 04 0.145549E 07 0.488522E 09 0.164303E 12  
0.553721E 14 0.880003E 03 0.145549E 07 0.488522E 09 0.164303E 12  
0.553721E 14 0.186986E 17 0.339313E 06 0.488522E 09 0.164303E 12  
0.553721E 14 0.186986E 17 0.632692E 19 0.128673E 09 0.164303E 12  
0.553721E 14 0.186986E 17 0.632692E 19 0.214499E 22 0.481807E 11

FOR DEGREE OF 1 COEFFICIENTS ARE

-0.14801E 02 0.44792E-01

310.03 -0.9137  
314.97 -0.6925  
320.14 -0.4609  
320.01 -0.4667  
324.98 -0.2441  
330.03 -0.0179  
334.97 0.2034  
340.14 0.4342  
340.01 0.4291  
344.98 0.6517  
350.03 0.8780  
354.97 1.0992  
360.14 1.3308

COS IS 0.10803  
SIN IS 0.02639  
BETA IS 0.02356

CD = 0.48400

CL = -0.00838

FOR DEGREE OF 2 COEFFICIENTS ARE

-0.57091E 02 0.29709E 00 -0.37791E-03

310.03 -1.0596  
314.97 -0.7549  
320.14 -0.4556  
320.01 -0.4629  
324.98 -0.1938  
330.03 0.0605  
334.97 0.2904

329.98 -0.1441  
330.03 -0.0179  
331.97 0.2034  
330.14 0.4349  
340.01 0.4271  
344.98 0.6517  
350.03 0.8780  
354.97 1.0992  
360.14 1.3308

COS IS 0.10803

SIN IS 0.02639

BETA IS 0.02356

CD = 0.48400

CL = -0.00838

FOR DEGREE OF 2 COEFFICIENTS ARE

-0.57091E 02 0.29789E 00 -0.37791E-03

310.03 -1.0596  
314.97 -0.7549  
320.14 -0.4556  
320.01 -0.4629  
324.98 -0.1938  
330.03 0.0605  
334.97 0.2906  
340.14 0.5117  
340.01 0.5064  
344.98 0.7003  
350.03 0.8783  
354.97 1.0338  
360.14 1.1767

COS IS 0.11202

SIN IS 0.02433

BETA IS 0.00576

CD = 0.46788

CL = -0.00965

FOR DEGREE OF 3 COEFFICIENTS ARE

-0.57796E 02 0.16100E 00 0.45920E-03 -0.12577E-05

310.03 -1.2211  
314.97 -0.8282  
320.14 -0.4552  
320.01 -0.4640  
324.98 -0.1421  
330.03 0.1461  
334.97 0.3893  
340.14 0.6017

340.03 0.7697  
344.97 0.7607  
350.03 0.8045  
354.97 0.9631  
360.14 0.9994

COS IS 0.11672  
SIN IS 0.02226  
BETA IS 0.00319

CD = 0.47242

CL = -0.01388

FOR DEGREE OF 4 COEFFICIENTS ARE

0.22222E 02 -0.24545E 00 0.51577E-04 0.35096E-05 -0.61454E-08

310.03 -1.1055  
314.97 -0.7853  
320.14 -0.4655  
320.01 -0.4733  
324.98 -0.1832  
330.03 0.0901  
334.97 0.3335  
340.14 0.5588  
340.01 0.5535  
344.98 0.7392  
350.03 0.8921  
354.97 1.0032  
360.14 1.0746

COS IS 0.11429  
SIN IS 0.02347  
BETA IS 0.00131

CD = 0.46924

CL = -0.01317

END OF RUN: SEQ 94:5

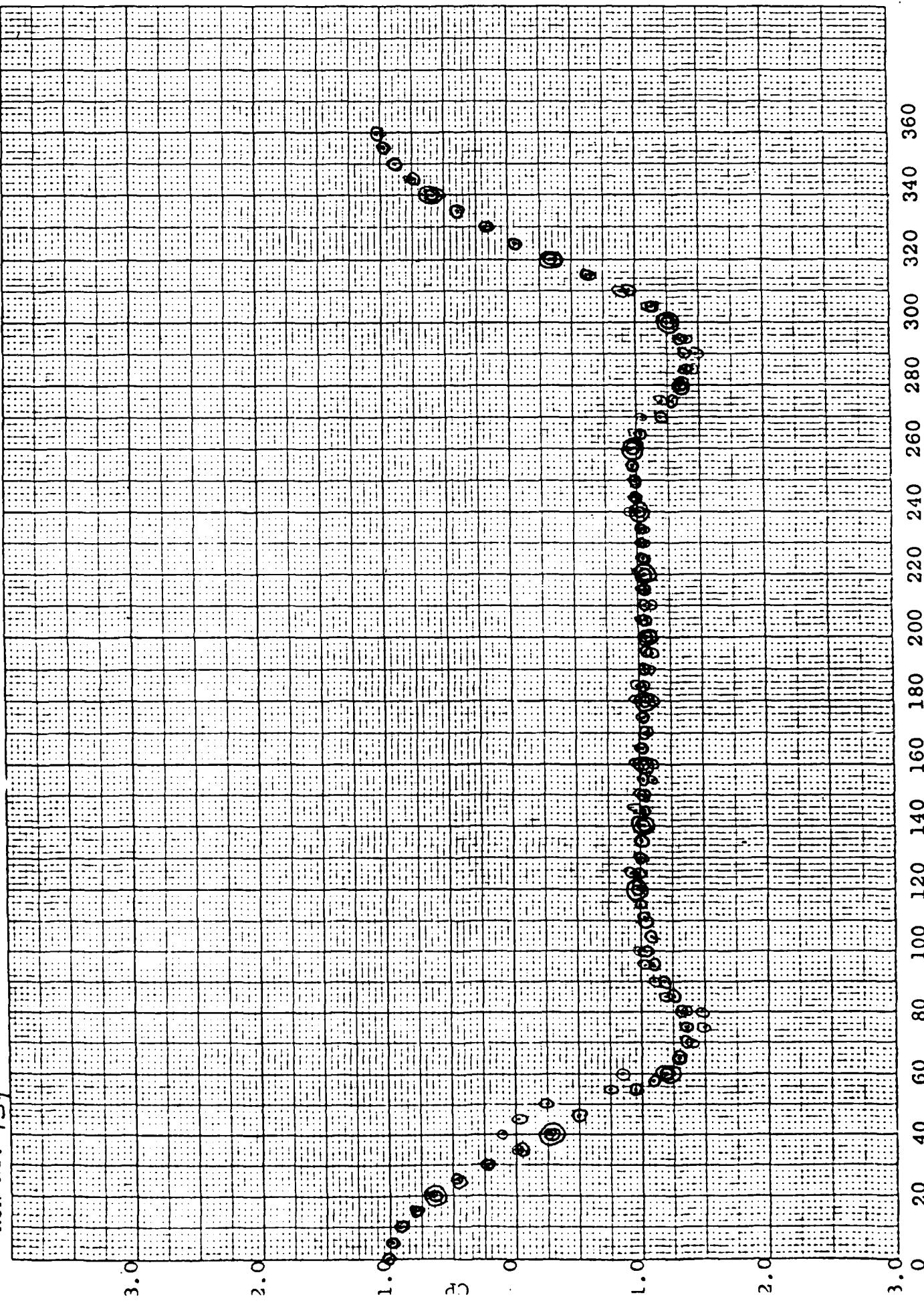
EXEC = 1.56 SU

STATEMENTS EXECUTED= 18717  
CORE USAGE OBJECT CODE= 14320 BYTES. ARRAY AREA= 3660 BYTES. TOTAL AREA AVAILABLE= 0  
DIAGNOSTICS NUMBER OF ERRORS= 0. NUMBER OF WARNINGS= 0. NUMBER OF EXTENSIONS= 0

END OF JGR MUSJOB CODE=MEG1 000 AT 08H57M FRI JUN 14, 1985 EXECUTE TIME 2.8 SERVICE UNIT  
420 CARDS READ 1372 LINES PRINTED 0 CARDS PUNCHED 0 TAPE MOUNTS 0 DISK MOUNTS

RUN NO: 139

INITIALS: FD



114.86 -1.0178  
119.97 -0.9899  
119.98 -0.9899  
124.94 -0.9739  
127.90 -0.9735  
134.86 -0.9937  
139.97 -1.0418  
139.98 -1.0419  
  
COS IS 0.17212  
SIN IS -0.30329  
BETA IS 0.00149

0 SECTION--4

X	Y
139.98	-1.0118
144.94	-0.9665
149.90	-1.0216
154.86	-1.1005
159.97	-1.0969
159.98	-0.9980
164.94	-1.0224
169.90	-1.0694
174.86	-1.0319
179.97	-1.1069
179.98	-0.9841
184.94	-0.9947
189.90	-1.0729
194.86	-1.1010
199.97	-1.0656
199.98	-1.0812
204.94	-1.0259
209.90	-1.0971
214.86	-1.0353
219.97	-1.0449
219.98	-1.0223

0.210000E 02	0.381858E 04	0.706883E 06	0.133085E 09	0.254515E 11
-0.219509E 02	0.381858E 04	0.706883E 06	0.133085E 09	0.254515E 11
0.493763E 13	-0.399675E 04	0.706883E 06	0.133085E 09	0.254515E 11
0.493763E 13	0.970354E 15	-0.740670E 06	0.133085E 09	0.254515E 11
0.493763E 13	0.970354E 15	0.192907E 18	-0.139565E 09	0.254515E 11
0.493763E 13	0.970354E 15	0.192907E 18	0.387435E 20	-0.267076E 11

FOR DEGREE OF 1 COEFFICIENTS ARE

-0.96868E 00 -0.42127E-03

139.98	-1.0276
144.94	-1.0297
149.90	-1.0318
154.86	-1.0339
159.97	-1.0361
159.98	-1.0361
164.94	-1.0382

FOR DEGREE OF 2 COEFFICIENTS ARE

-0.48100E 01 0.61052E-01 -0.24345E-03

99.98	-1.1396
104.94	-1.0842
109.90	-1.0408
110.98	-1.0329
114.86	-1.0094
119.97	-0.9895
119.98	-0.9895
124.94	-0.9824
129.90	-0.9873
134.86	-1.0042
139.97	-1.0341
139.98	-1.0342

COS IS 0.17268

SIN IS -0.30366

BETA IS 0.00083

FOR DEGREE OF 3 COEFFICIENTS ARE

-0.38873E 01 0.37557E-01 -0.45455E-04 -0.55213E-06

99.98	-1.1385
104.94	-1.0847
109.90	-1.0417
110.98	-1.0338
114.86	-1.0099
119.97	-0.9892
119.98	-0.9892
124.94	-0.9813
129.90	-0.9859
134.86	-1.0033
139.97	-1.0351
139.98	-1.0352

COS IS 0.17261

SIN IS -0.30362

BETA IS 0.00096

FOR DEGREE OF 4 COEFFICIENTS ARE

0.10297E 01 -0.45220E-01 -0.44527E-04 0.51770E-05 -0.23626E-07

99.98	-1.1226
104.94	-1.0876
109.90	-1.0515
110.90	-1.0438

114.86	-1.0178
119.97	-0.9899
119.98	-0.9899
124.94	-0.9739
129.90	-0.9735
134.86	-0.9937
139.97	-1.0418
139.98	-1.0419

COS IS 0.17212

SIN IS -0.30329

BETA IS 0.00149

SECTION -4

X	Y
139.98	-1.0118
144.94	-0.2665
149.90	-1.0216
154.86	-1.1005
159.97	-1.0969
159.98	-0.9980
164.94	-1.0224
169.90	-1.0674

89.90 -1.1848  
94.86 -1.1058  
99.97 -1.0307  
99.98 -1.0306

COS IS -0.13842  
SIN IS -0.50141  
BETA IS 0.01854

SECTION--3

X	Y
99.98	-1.1592
104.94	-1.0613
109.90	-1.0598
110.98	-0.9990
114.86	-1.0263
119.97	-1.0155
119.98	-0.9668
124.94	-0.9470
129.90	-1.0283
134.86	-1.0127
139.97	-1.0396
139.98	-1.0118

0.120000E 02	0.145026E 04	0.177241E 06	0.218985E 08	0.273414E 10
-0.123279E 02	0.145026E 04	0.177241E 06	0.218985E 08	0.273414E 10
0.344798E 12	-0.140600E 04	0.177241E 06	0.218985E 08	0.273414E 10
0.344798E 12	0.438924E 14	-0.181207E 06	0.218985E 08	0.273414E 10
0.344798E 12	0.438924E 14	0.563661E 16	-0.223476E 08	0.273414E 10
0.344798E 12	0.438924E 14	0.563661E 16	0.729726E 18	-0.278617E 10

FOR DEGREE OF 1 COEFFICIENTS ARE

-0.12657E 01 0.19725E-02

99.98	-1.0685
104.94	-1.0587
109.90	-1.0489
110.98	-1.0468
114.86	-1.0391
119.97	-1.0291
119.98	-1.0290
124.94	-1.0193
129.90	-1.0095
134.86	-0.9997
139.97	-0.9896
139.98	-0.9896

COS IS 0.17444  
SIN IS -0.30566  
BETA IS 0.00236

57.97 -1.0324  
59.98 -1.0985  
64.94 -1.2318  
69.90 -1.3227  
74.86 -1.3714  
79.98 -1.3772  
84.94 -1.3398  
89.90 -1.2601  
94.86 -1.1381  
99.97 -0.9681  
99.98 -0.9677

COS IS -0.13703

SIN IS -0.50633

BETA IS 0.01852

FOR DEGREE OF 3 COEFFICIENTS ARE

0.97064E 01 -0.38862E 00 0.44235E-02 -0.16110E-04

46.02 -0.3797  
54.86 -0.9600  
57.97 -1.0949  
59.98 -1.1652  
64.94 -1.2876  
69.90 -1.3468  
74.86 -1.3545  
79.98 -1.3211  
84.94 -1.2606  
89.90 -1.1845  
94.86 -1.1045  
99.97 -1.0305  
99.98 -1.0304

COS IS -0.13838

SIN IS -0.50137

BETA IS 0.01606

FOR DEGREE OF 4 COEFFICIENTS ARE

0.10569E 02 -0.43729E 00 0.54259E-02 -0.25058E-04 0.29297E-07

46.02 -0.3749  
54.86 -0.9630  
57.97 -1.0979  
59.98 -1.1677  
64.94 -1.2884  
69.90 -1.3457  
74.86 -1.3524  
79.98 -1.3190  
84.94 -1.2595

89.90 -1.1848  
94.86 -1.1058  
99.97 -1.0307  
99.98 -1.0306

COS IS -0.13842

SIN IS -0.50141

BETA IS 0.01854

0  
SECTION--3  
X Y  
99.98 -1.1592  
104.94 -1.0613  
109.90 -1.0598  
110.98 -0.9990  
114.86 -1.0265  
117.97 -1.0155  
119.98 -0.9668  
124.94 -0.9470  
129.90 -1.0286  
134.86 -1.0127  
139.97 -1.0396  
139.98 -1.0118

BETA IS 0.00025

SECTION--2

X	Y
46.02	-0.4990
54.86	-0.7520
57.97	-0.9835
59.98	-1.2173
64.94	-1.3158
69.90	-1.4323
74.86	-1.5115
79.98	-1.3517
84.94	-1.1756
89.90	-1.0910
94.86	-1.0404
99.97	-0.9913
99.98	-1.1592

0.130000E 02	0.978159E 03	0.774748E 05	0.641118E 07	0.549904E 09
-0.145296E 02	0.978159E 03	0.774748E 05	0.641118E 07	0.549904E 09
0.485312E 11	-0.111270E 04	0.774748E 05	0.641118E 07	0.549904E 09
0.485312E 11	0.437974E 13	-0.888241E 05	0.641118E 07	0.549904E 09
0.485312E 11	0.437974E 13	0.402184E 15	-0.735235E 07	0.549904E 09
0.485312E 11	0.437974E 13	0.402184E 15	0.374366E 17	-0.627822E 09

FOR DEGREE OF 1 COEFFICIENTS ARE

-0.72622E 00 -0.51931E-02

46.02	-0.9652
54.86	-1.0111
57.97	-1.0273
59.98	-1.0377
64.94	-1.0635
69.90	-1.0892
74.86	-1.1150
79.98	-1.1416
84.94	-1.1673
89.90	-1.1931
94.86	-1.2188
99.97	-1.2454
99.98	-1.2454

COS IS -0.13696

SIN IS -0.48246

BETA IS 0.07416

FOR DEGREE OF 2 COEFFICIENTS ARE

0.38639E 01 -0.13433E 00 0.86021E-03

46.02	-0.4961
54.86	-0.9165

19.98 0.6285  
24.94 0.4565  
29.90 0.2579  
34.86 0.0325  
39.97 -0.2276  
46.02 -0.5722

COS IS 0.17254

SIN IS 0.02664

BETA IS 0.00221

FOR DEGREE OF 3 COEFFICIENTS ARE

0.10004E 01 0.75146E-02 -0.15730E-02 0.15039E-04

-0.02 1.0003  
4.94 1.0010  
9.90 0.9352  
14.86 0.8141  
19.97 0.6429  
19.98 0.6426  
24.94 0.4427  
29.90 0.2208  
34.86 -0.0121  
39.97 -0.2520  
46.02 -0.5195

COS IS 0.17242

SIN IS 0.02532

BETA IS 0.00067

FOR DEGREE OF 4 COEFFICIENTS ARE

0.10203E 01 -0.79133E-02 0.75507E-04 -0.41836E-04 0.61521E-06

-0.02 1.0204  
4.94 0.9783  
9.90 0.9146  
14.86 0.8121  
19.97 0.6570  
19.98 0.6566  
24.94 0.4589  
29.90 0.2245  
34.86 -0.0276  
39.97 -0.2767  
46.02 -0.5021

COS IS 0.17053

SIN IS 0.02458

BETA IS 0.00025

SECTION--2

X Y  
46.02 -0.4990  
54.86 -0.7520  
57.97 -0.9835  
59.98 -1.2173  
64.94 -1.3158  
69.90 -1.4323  
74.86 -1.5115  
79.98 -1.3517  
84.94 -1.1756  
89.70 -1.0710  
94.86 -1.0404  
99.97 -0.9913  
99.98 -1.1592

0.10000E 02 0.97015E 03 0.77474E 05 0.64111E 07 0.54990E 09  
-0.14520E 02 0.97015E 03 0.77474E 05 0.64111E 07 0.54990E 09  
0.48531E 11 -0.11127E 04 0.77474E 05 0.64111E 07 0.54990E 09  
0.48531E 11 0.43797E 13 -0.80824E 05 0.64111E 07 0.54990E 09  
0.48531E 11 0.43797E 13 0.40218E 15 0.73523E 07 0.54990E 09  
0.48531E 11 0.43797E 13 0.40218E 15 0.37456E 17 0.17322E 09

FOR DEGREE OF 1 COEFFICIENTS ARE

RUN: SEQ

139.5

0

SECTION--1

X	Y
-0.02	1.0166
4.94	0.9856
9.90	0.9199
14.86	0.7998
19.97	0.6315
19.98	0.6738
24.94	0.4736
29.90	0.2241
34.86	-0.0245
39.97	-0.2854
46.02	-0.4990

0.110000E 02	0.245320E 03	0.758791E 04	0.266238E 06	0.100778E 08
0.491599E 01	0.245320E 03	0.758791E 04	0.266238E 06	0.100778E 08
0.400637E 09	0.352000E 02	0.758791E 04	0.266238E 06	0.100778E 08
0.400637E 09	0.164652E 11	-0.235955E 03	0.266238E 06	0.100778E 08
0.400637E 09	0.164652E 11	0.692760E 12	-0.405198E 05	0.100773E 08
0.400637E 09	0.164652E 11	0.692760E 12	0.296543E 14	-0.238418E 07

FOR DEGREE OF 1 COEFFICIENTS ARE

0.12311E 01 -0.35163E-01

-0.02	1.2318
4.94	1.0574
9.90	0.8830
14.86	0.7086
19.97	0.5289
19.98	0.5286
24.94	0.3541
29.90	0.1797
34.86	0.0053
39.97	-0.1744
46.02	-0.3871

COS IS 0.16855

SIN IS 0.02508

BETA IS 0.01497

FOR DEGREE OF 2 COEFFICIENTS ARE

0.10508E 01 -0.10293E-01 -0.54267E-03

-0.02	1.0510
4.94	0.9867
9.90	0.8957
14.86	0.7780
19.97	0.6288

```

303      XF1=XL/57.3
304      ELSE
305          XF1=XF/57.3
306      ENDIF
307      C
308          T1=C1(1)*(-COS(XF1))
309          TB1=SIN(XF1)-(XF1*COS(XF1))
310          T2=T1+(C1(2)*TB1)
311          IF(J.EQ.2)THEN
312              TT5=0.5*T2
313          ELSE
314              TB2=(2.*XF1)*SIN(XF1)
315              TR3=TB2+((2.-(XF1**2))*COS(XF1))
316              T3=T2+(C1(3)*TR3)
317          ENDIF
318          IF(J.EQ.3)THEN
319              TT5=0.5*T3
320          ENDIF
321          IF((J.NE.2).AND.(J.NE.3))THEN
322              TB4=((3.*(XF1**2))-6.)*SIN(XF1)
323              TB5=TB4+(((6.*XF1)-(XF1**3))*COS(XF1))
324              T4=T3+(C1(4)*TB5)
325          ENDIF
326          IF(J.EQ.4)THEN
327              TT5=0.5*T4
328          ENDIF
329          IF(J.EQ.5)THEN
330              T5=((4.*(XF1**3))-(24.*XF1))*SIN(XF1)
331              T6=((XF1**4)-(12.*XF1**2))+24.)*COS(XF1)
332              T7=(T5-T6)*C1(5)
333              TB=T4+T7
334              TT5=0.5*TB
335          ENDIF
336          IF(I.EQ.1)THEN
337              SUM2=TT5
338          ENDIF
339          IF(I.EQ.2)THEN
340              SUM1=TT5
341          ENDIF
342      10 CONTINUE
343      C
344          ALPHA=SUM2-SUM1
345          PRINT .'
346          PRINT 66.ALPHA
347          66 FORMAT(9X,' SIN IS ',F10.5)
348          IF(J.EQ.2)THEN
349              CL3=CL3+ALPHA
350          ENDIF
351          IF(J.EQ.3)THEN
352              CL2=CL2+ALPHA
353          ENDIF
354          IF(J.EQ.4)THEN
355              CL=CL+ALPHA
356          ENDIF
357          IF(J.EQ.5)THEN
358              CL1=CL1+ALPHA
359          ENDIF
360          RETURN
361      END

```

RUN: SEQ  
139:5

0

SECTION--1

X	Y			
-0.02	1.0166			
4.94	0.9056			
9.90	0.9199			
14.86	0.7998			
19.97	0.6315			
19.98	0.6738			
24.94	0.4736			
29.90	0.2241			
34.86	-0.0245			
39.97	-0.2854			
46.02	-0.4990			
0.110000E 02	0.245320E 03	0.758791E 04	0.266238E 06	0.100778E 08
0.491599E 01	0.245320E 03	0.758791E 04	0.266238E 06	0.100778E 08
0.400637E 09	0.352000E 02	0.758791E 04	0.266238E 06	0.100778E 08
0.400637E 07	0.164652E 11	-0.235955E 03	0.266238E 06	0.100778E 08
0.400637E 07	0.164652E 11	0.692760E 12	-0.405190E 05	0.100778E 08
0.400637E 09	0.164652E 11	0.692760E 12	0.296543E 14	-0.238410E 07

```

247      TB2=(2.*XF1)*COS(XF1)
248      TB3=TB2+(((XF1**2)-2.)*SIN(XF1))
249      T3=T2+(C1(3)*TB3)
250      ENDIF
251      IF(J.EQ.3)THEN
252          TT5=0.5*T3
253      ENDIF
254      IF((J.NE.2).AND.(J.NE.3))THEN
255          TB4=((3.*XF1**2))-6.)*COS(XF1)
256          TB5=TB4+((XF1**3)-(6.*XF1))*SIN(XF1)
257          T4=T3+(C1(4)*TB5)
258      ENDIF
259      IF(J.EQ.4)THEN
260          TT5=0.5*T4
261      ENDIF
262      IF(J.EQ.5)THEN
263          T5=((XF1**4)-(12.*XF1**2))+24.)*SIN(XF1)
264          T6=((4.*XF1**3)-(24.*XF1))*COS(XF1)
265          T7=(T5+T6)*C1(5)
266          TB=T4+T7
267          TT5=0.5*TB
268      ENDIF
269      IF(I.EQ.1)THEN
270          SUM2=TT5
271      ENDIF
272      IF(I.EQ.2)THEN
273          SUM1=TT5
274      ENDIF
275 10 CONTINUE
C
276      ALPHA=SUM2-SUM1
277      PRINT 1
278      PRINT 66,ALPHA
279 66 FORMAT(9X,' COS IS ',F10.5)
280      IF(J.EQ.2)THEN
281          CE3=CE3+ALPHA
282      ENDIF
283      IF(J.EQ.3)THEN
284          CE2=CE2+ALPHA
285      ENDIF
286      IF(J.EQ.4)THEN
287          CE=CE+ALPHA
288      ENDIF
289      IF(J.EQ.5)THEN
290          CE1=CE1+ALPHA
291      ENDIF
292      RETURN
293  END
294  SUBROUTINE SINTEG(XF,XL,J,B1,CL,CL1,CL2,CL3)
295  REAL C1(100),B1(100)
C
296  C1(1)=B1(1)
297  DO 5 K=2,J
298      C1(K)=B1(K)*(57.3***(K-1))
299  5 CONTINUE
C
300  ALPHA=0.0
301  DO 10 I=1,2
302      IF(I.EQ.1)THEN

```

```

197      ELSE
198          A(I,J)=(A(I,J)-SUM)/A(I,I)
199      ENDIF
200      ENDIF
201 30 CONTINUE
202      RETURN
203      C 100 FORMAT(' REDUCTION NOT COMPLETED BECAUSE SMALL VALUE'.
204      I     ' FOUND FOR DIVISION IN ROW ',I3)
205      END
206      C SUBROUTINE SOLNG(A,B,N,NDIM)
207      REAL A(NDIM,NDIM),B(NDIM),SUM
208      INTEGER N,I,IM1,K,J,NMJP1,NMJP2
209      C
210      B(1)=B(1)/A(1,1)
211      DO 20 I=2,N
212          IM1=I-1
213          SUM=0.0
214          DO 10 K=1,IM1
215              SUM=SUM+A(I,K)*B(K)
216          10 CONTINUE
217          B(I)=(B(I)-SUM)/A(I,I)
218      20 CONTINUE
219      C
220      DO 40 J=2,N
221          NMJP2=N-J+2
222          NMJP1=N-J+1
223          SUM=0.0
224          DO 30 K=NJJP2,N
225              SUM=SUM+A(NMJP1,K)*B(K)
226          30 CONTINUE
227          B(NMJP1)=B(NMJP1)-SUM
228      40 CONTINUE
229      RETURN
230      END
231      C SUBROUTINE CINTEG(XF,XL,J,B1,CE,CE1,CE2,CE3)
232      REAL C1(100),B1(100)
233      C
234      C1(1)=B1(1)
235      DO 5 K=2,J
236          C1(K)=B1(K)*(57.3***(K-1))
237      5 CONTINUE
238      C
239      ALPHA=0.0
240      DO 10 I=1,2
241          IF(I.EQ.1)THEN
242              XF1=XL/57.3
243          ELSE
244              XF1=XF/57.3
245          ENDIF
246          C
247          T1=C1(1)*SIN(XF1)
248          TB1=COS(XF1)+(XF1*SIN(XF1))
249          T2=T1+(C1(2)*TB1)
250          ENDIF
251          IF(J.EQ.3)THEN
252              TT5=0.5*T2
253          ENDIF
254          IF((J.NE.2).AND.(J.NE.3))THEN
255              TB4=((3.*(XF1**2))-6.)*COS(XF1)
256              TB5=TB4+((XF1**3)-(6.*XF1))*SIN(XF1)
257              T4=T3+(C1(4)*TB5)
258          ENDIF
259          IF(J.EQ.4)THEN
260              TT5=0.5*T4
261          ENDIF
262          IF(J.EQ.5)THEN
263              T5=((XF1**4)-(12.*XF1**2)+(24.)*XF1**1)
264              T6=((4.-(XF1**3)).*(24.*XF1**1)+0.)*(-1)
265              T7=(T5+T6)*C1(5)
266              TB=T4+T7
267              TT5=0.5*TB
268          ENDIF
269          IF(I.EQ.1)THEN
270              SUM2=TT5
271          ENDIF
272          IF(I.EQ.2)THEN
273              SUM1=TT5

```

```

150      IF((KK.EQ.7).AND.(I.EQ.5))THEN
151      PRINT 301,CE1,CL1
152      ENDIF
153      95 CONTINUE
C
C      154      999 CONTINUE
C
155      200 FORMAT(//'* DEGREE OF POLYNOMIAL CANNOT EXCEED N - 1.*'
156      |      ' REQUESTED MAXIMUM DEGREE TOO LARGE - '
157      |      'REDUCED TO ',I3)
158      201 FORMAT(5(3X,E13.6))
159      202 FORMAT(' FOR DEGREE OF ',I2,' COEFFICIENTS ARE'//
160      |      ' .5X.6(2X,E12.5)')
161      203 FORMAT(9X,' BETA IS ',F10.5//)
162      PRINT 299,ISEQ
163      299 FORMAT(/////.35X,'END OF RUN SEQ ',.5A1///)
164      STOP
C
165      REMOTE BLOCK COEF
166      DO 66 L=1,I
167      N1=I-L+1
168      CP(N1)=C(L)
169      66 CONTINUE
C
170      DO 55 K=1,N
171      FV=CP(1)
172      DO 49 J=2,I
173      49   FV=(FV*X(K))+CP(J)
174      PRINT 1,X(K),FV
175      55 CONTINUE
176      END BLOCK
177      END
C
178      SUBROUTINE LUDCMQ(A,N,NDIM)
179      REAL A(NDIM,NDIM),SUM
180      INTEGER N,I,J,JM1,IM1,K
C
181      DO 30 I=1,N
182      DO 30 J=2,N
183      SUM=0.0
184      IF(J.LE.I)THEN
185      JM1=J-1
186      DO 10 K=1,JM1
187      SUM=SUM+A(I,K)*A(K,J)
188      10  CONTINUE
189      A(I,J)=A(I,J)-SUM
190      ELSE
191      IM1=I-1
192      IF(IM1.NE.0)THEN
193      DO 20 K=1,IM1
194      SUM=SUM+A(I,K)*A(K,J)
195      20  CONTINUE
196      ENDIF
C
197      IF(ABS(A(I,I)).LT. 1.0E-10)THEN
198      PRINT 100,I
199      RETURN

```

```

98      DO 50 I=2,MFP1
99      A(MFP1,I)=0.0
100     DO 40 J=1,N
101      A(MFP1,I)=A(MFP1,I)+XN(J)
102      XN(J)=XN(J)*X(J)
103      40 CONTINUE
104      50 CONTINUE
C
105      DO 70 J=2,MFP1
106      DO 60 I=1,MF
107      A(I,J)=A(I+1,J-1)
108      60 CONTINUE
109      70 CONTINUE
C
110      PRINT ''
111      PRINT 201. ((A(I,J),J=1,MFP2),I=1,MFP1)
C
112      CALL LUDCMQ(A,MFP1,10)
C
113      MFP1=MSP+1
114      DO 95 I=MSP1,MFP1
115      DO 90 J=1,I
116      C(J)=A(J,MFP2)
117      90 CONTINUE
118      CALL SOLNQ(A,C,I,10)
119      IM1=I-1
C
120      PRINT 202,IM1,(C(J),J=1,I)
121      PRINT ''
122      EXECUTE COEF
C
123      DO 300 K=1,I
124      B1(K)=C(K)
125      CALL CINTEG(XF,XL,I,B1,CE,CE1,CE2,CE3)
126      CALL SINTEG(XF,XL,I,B1,CL,CL1,CL2,CL3)
C
127      PRINT ''
128      BETA=0.0
129      DO 94 IPT =1,N
130      SUM=0.0
131      DO 93 ICOEF=2,I
132      JCOEF=I-ICOEF+2
133      SUM=(SUM+C(JCOEF))*X(IPT)
134      93 CONTINUE
135      SUM=SUM+C(1)
136      BETA=BETA+(Y(IPT)-SUM)**2
137      94 CONTINUE
138      BETA=BETA/(N-I)
139      PRINT 203,BETA
140      IF((KK.EQ.7).AND.(I.EQ.2))THEN
141      PRINT 301,CE3,CL3
142      ENDIF
143      IF((KK.EQ.7).AND.(I.EQ.3))THEN
144      PRINT 301,CE2,CL2
145      ENDIF
146      IF((KK.EQ.7).AND.(I.EQ.4))THEN
147      PRINT 301,CE,CL
148      301 FORMAT(//45X,' CD =',F10.5//,45X,' CL =',F10.5)
149      ENDIF
C
150      IF((KK.EQ.7).AND.(I.EQ.5))THEN
151      PRINT 301,CE1,CL1
152      ENDIF
153      95 CONTINUE
C
154      999 CONTINUE
C
155      200 FORMAT(//', DEGREE OF POLYNOM... CANNOT EXCEED N - 1.',/
156      |', REQUESTED MAXIMUM DEGREE TOO LARGE - ',/
157      |', REDUCED TO ',I3)
158      201 FORMAT(5(3X,E13.6))
159      202 FORMAT(/' FOR DEGREE OF ',I2,' COEFFICIENTS ARE'//,
160      |',5X,6(2X,E12.5))
161      203 FORMAT(9X,' BETA IS ',F10.5//)
162      PRINT 299,ISEQ
163      299 FORMAT(////////.35X,'END OF RUN SEQ ',SA1///)
164      STOP
C
165      REMOTE BLOCK COFF
166      DO 66 L=1,I
167      N1=I-L+1
168      CP(N1)=C(L)
169      66 CONTINUE
C
170      DO 55 K=1,N

```

```

      C
50      PRINT ., X          Y
51      IF(KK.EQ.1)THEN
52          DO 3 I=1,N
53              READ ., K1,Y(I),K2,X(I)
54              TEMP1=X(N)
55              TEMP2=Y(N)
56          ENDIF
57          IF(KK.NE.1)THEN
58              X(1)=TEMP1
59              Y(1)=TEMP2
60          DO 4 I=2,N
61              READ ., K1,Y(I),K2,X(I)
62              TEMP1=X(N)
63              TEMP2=Y(N)
64          ENDIF
C
65      PRINT 1,(X(I),Y(I),I=1,N)
66      1 FORMAT(2X,F6.2,2X,F8.4)
C
67      IF(KK.EQ.1)THEN
68          XF=0.0
69          XL=X(N)
70      ELSE
71          XF=X(1)
72          XL=X(N)
73      ENDIF
C
74      IF(KK.EQ.7)THEN
75          XF=X(1)
76          XL=360.
77      ELSE
78          XL=X(N)
79      ENDIF
C
C      READ ., MS, MF
C
80      IF(MF.GT.(N-1))THEN
81          MF=N-1
82          PRINT 200,MF
83      ENDIF
84      5 MFP1=MF+1
85      MFP2=MF+2
C
86      DO 10 I=1,N
87          XN(I)=1.0
88      10 CONTINUE
C
89      DO 30 I=1,MFP1
90          A(I,1)=0.0
91          A(I,MFP2)=0.0
92          DO 20 J=1,N
93              A(I,1)=A(I,1)+XN(J)
94              A(I,MFP2)=A(I,MFP2)+Y(J)*XN(J)
95              XN(J)=XN(J)*X(J)
96          20 CONTINUE
97          30 CONTINUE

```

```

1      DIMENSION ISEQ(5)
2      REAL X(100),Y(100),C(100),B1(100),A(10,11),XNC(100),SUM,BETA
3      REAL CP(100),FV
4      INTEGER N,MS,MF,MFP1,MFP2,I,J,IM1,IPT,ICDEF,JCDEF
5      CHARACTER*5 ISEQ
6      DATA MS/1/,MF/4/
7
8      C
9      C
10     PRINT *,RUN:SEQ'
11     READ 11,ISEQ
12     11 FORMAT(5A1)
13     PRINT 11,ISEQ
14     PRINT *,'-----'
15
16     C
17     CE=0.0
18     CL=0.0
19     CE1=0.0
20     CL1=0.0
21     CE2=0.0
22     CL2=0.0
23     CE3=0.0
24     CL3=0.0
25     DO 999 KK=1,7
26     PRINT 33
27     33 FORMAT('0')
28     IF(KK.EQ.1)THEN
29       PRINT *,SECTION--1'
30       N=11
31     ENDIF
32
33     C
34     IF(KK.EQ.2)THEN
35       PRINT *,SECTION--2'
36       N=13
37     ENDIF
38
39     C
40     IF(KK.EQ.3)THEN
41       PRINT *,SECTION--3'
42       N=12
43     ENDIF
44
45     C
46     IF(KK.EQ.4)THEN
47       PRINT *,SECTION--4'
48       N=21
49     ENDIF
50
51     C
52     IF(KK.EQ.5)THEN
53       PRINT *,SECTION--5'
54       N=11
55     ENDIF
56
57     C
58     IF(KK.EQ.6)THEN
59       PRINT *,SECTION--6'
60       N=13
61     ENDIF
62
63     C
64     IF(KK.EQ.7)THEN
65       PRINT *,SECTION-7'
66       N=13
67     ENDIF
68
69     C
70     PRINT *,X          Y'
71     IF(KK.EQ.1)THEN
72       DO 3 I=1,N
73         READ , K1,Y(I),K2,X(I)
74         TEMP1=X(N)
75         TEMP2=Y(N)
76       ENDIF
77     IF(KK.NE.1)THEN
78       X(1)=TEMP1
79       Y(1)=TEMP2
80       DO 4 I=2,N
81         READ ,K1,Y(I),K2,X(I)
82         TEMP1=X(N)
83         TEMP2=Y(N)
84       ENDIF
85
86     C
87     PRINT 1,(X(I),Y(I),I=1,N)
88     1 FORMAT(2X,F6.2,2X,F8.4)
89
90     C
91     IF(KK.EQ.1)THEN
92       XF=0.0
93       XL=X(N)
94     ELSE
95       XF=X(1)
96       XL=X(N)
97     ENDIF

```

169.90 -1.0402  
174.86 -1.0423  
179.97 -1.0445  
179.98 -1.0445  
184.94 -1.0466  
189.90 -1.0487  
194.86 -1.0508  
199.97 -1.0529  
199.98 -1.0529  
204.94 -1.0550  
209.90 -1.0571  
214.86 -1.0592  
219.97 -1.0613  
219.98 -1.0613

COS IS 0.67135

SIN IS 0.00222

BETA IS 0.00180

FOR DEGREE OF 2 COEFFICIENTS ARE

-0.26577E 00 -0.83080E-02 0.21722E-04

139.98 -1.0031  
144.94 -1.0136  
149.90 -1.0230  
154.86 -1.0314  
159.97 -1.0389  
159.98 -1.0389  
164.94 -1.0451  
169.90 -1.0503  
174.86 -1.0543  
179.97 -1.0574  
179.98 -1.0574  
184.94 -1.0593  
189.90 -1.0601  
194.86 -1.0599  
199.97 -1.0585  
199.98 -1.0585  
204.94 -1.0561  
209.90 -1.0526  
214.86 -1.0480  
219.97 -1.0422  
219.98 -1.0422

COS IS 0.67270

SIN IS 0.00263

BETA IS 0.00174

FOR DEGREE OF 3 COEFFICIENTS ARE

-0.45509E 00 -0.50696E-02 0.34717E-05 0.33893E-07

139.98 -1.0037  
144.94 -1.0137  
149.90 -1.0229  
154.86 -1.0310  
159.97 -1.0385  
159.98 -1.0385  
164.94 -1.0447  
169.90 -1.0500  
174.86 -1.0542  
179.97 -1.0575  
179.98 -1.0575  
184.94 -1.0595  
189.90 -1.0605  
194.86 -1.0604  
199.97 -1.0590  
199.98 -1.0590  
204.94 -1.0565  
209.90 -1.0528  
214.86 -1.0479  
219.97 -1.0415  
219.98 -1.0415

COS IS 0.67273

SIN IS 0.00267

-0.45509E 00 -0.50696E-02 0.34717E-05 0.33893E-07

139.98 -1.0037  
144.94 -1.0137  
149.90 -1.0229  
154.86 -1.0310  
159.97 -1.0385  
159.98 -1.0385  
164.94 -1.0447  
169.90 -1.0500  
174.86 -1.0542  
179.97 -1.0575  
179.98 -1.0575  
184.94 -1.0595  
189.90 -1.0605  
194.86 -1.0604  
199.97 -1.0590  
199.98 -1.0590  
204.94 -1.0565  
209.90 -1.0528  
214.86 -1.0479  
219.97 -1.0415  
219.98 -1.0415

COS IS 0.67273

SIN IS 0.00267

BETA IS 0.00184

FOR DEGREE OF 4 COEFFICIENTS ARE

-0.56109E 00 -0.45290E-02 0.14482E-04 -0.63854E-07 0.21166E-09

139.98 -1.0052  
144.94 -1.0143  
149.90 -1.0228  
154.86 -1.0306  
159.97 -1.0378  
159.98 -1.0378  
164.94 -1.0440  
169.90 -1.0493  
174.86 -1.0537  
179.97 -1.0573  
179.98 -1.0573  
184.94 -1.0596  
189.90 -1.0609  
194.86 -1.0610  
199.97 -1.0598  
199.98 -1.0598  
204.94 -1.0573  
209.90 -1.0533  
214.86 -1.0479  
219.97 -1.0407  
219.98 -1.0406

COS IS 0.67275

SIN IS 0.00271

BETA IS 0.00196

SECTION--5

X	Y
219.98	-1.0223
224.94	-1.0467
229.90	-1.0451
234.86	-1.0526
239.97	-1.0380
239.98	-0.9529
244.94	-0.9740
249.90	-0.9793
254.86	-0.9628
259.97	-0.9828
259.98	-0.9598

0.110000E 02	0.265928E 04	0.644751E 06	0.156769E 09	0.382251E 11
-0.110163E 02	0.265928E 04	0.644751E 06	0.156769E 09	0.382251E 11
0.934615E 13	-0.265928E 04	0.644751E 06	0.156769E 09	0.382251E 11
0.934615E 13	0.229132E 16	-0.643806E 06	0.156769E 09	0.382251E 11
0.934615E 13	0.229132E 16	0.563217E 18	-0.156312E 09	0.382251E 11
0.934615E 13	0.229132E 16	0.563217E 18	0.138795E 21	-0.380593E 11

FOR DEGREE OF 1 COEFFICIENTS ARE

-0.15121E 01 0.21120E-02

219.98	-1.0475
224.94	-1.0370
229.90	-1.0265
234.86	-1.0160
239.97	-1.0052
239.98	-1.0052
244.94	-0.9947
249.90	-0.9843
254.86	-0.9738
259.97	-0.9630
259.98	-0.9630

COS IS 0.17355

SIN IS 0.29676

BETA IS 0.00080

FOR DEGREE OF 2 COEFFICIENTS ARE

-0.10929E 01 -0.13742E-02 0.72278E-05

219.98	-1.0454
224.94	-1.0363
229.90	-1.0268

234.86	-1.0170
239.97	-1.0065
239.98	-1.0064
244.94	-0.9959
249.90	-0.9849
254.86	-0.9737
259.97	-0.9617
259.98	-0.9617

COS IS 0.17359

SIN IS 0.29685

BETA IS 0.00090

FOR DEGREE OF 3 COEFFICIENTS ARE

-0.90292E 00 -0.42227E-02 0.21037E-04 -0.21807E-07

219.98	-1.0459
224.94	-1.0365
229.90	-1.0268
234.86	-1.0168
239.97	-1.0061
239.98	-1.0061

234.86 -1.0170  
239.97 -1.0065  
239.98 -1.0064  
244.94 -0.9959  
249.90 -0.9849  
254.86 -0.9737  
259.97 -0.9617  
259.98 -0.9617

COS IS 0.17359

SIN IS 0.29685

BETA IS 0.00090

FOR DEGREE OF 3 COEFFICIENTS ARE

-0.90292E 00 -0.42227E-02 0.21037E-04 -0.21807E-07

219.98 -1.0459  
224.94 -1.0365  
229.90 -1.0268  
234.86 -1.0160  
239.97 -1.0061  
239.98 -1.0061  
244.94 -0.9955  
249.90 -0.9847  
254.86 -0.9737  
259.97 -0.9621  
259.98 -0.9620

COS IS 0.17358

SIN IS 0.29683

BETA IS 0.00103

FOR DEGREE OF 4 COEFFICIENTS ARE

-0.37306E 01 0.16109E-01 0.58441E-04 -0.57191E-06 0.10245E-08

219.98 -1.0480  
224.94 -1.0365  
229.90 -1.0258  
234.86 -1.0157  
239.97 -1.0055  
239.98 -1.0055  
244.94 -0.9956  
249.90 -0.9853  
254.86 -0.9744  
259.97 -0.9621  
259.98 -0.9621

COS IS 0.17356

SIN IS 0.29681

BETA IS 0.00123

SECTION--6

X	Y
259.98	-0.9598
264.94	-0.9955
269.90	-1.0633
274.86	-1.1925
279.97	-1.3674
279.98	-1.3655
284.94	-1.4562
289.90	-1.4585
294.86	-1.3758
299.97	-1.2466
299.98	-1.2761
304.94	-1.1038
309.90	-0.8904

0.130000E 02	0.371412E 04	0.106412E 07	0.305726E 09	0.880768E 11
-0.157514E 02	0.371412E 04	0.106412E 07	0.305726E 09	0.880768E 11
0.254423E 14	-0.450586E 04	0.106412E 07	0.305726E 09	0.880768E 11
0.254423E 14	0.736872E 16	-0.129210E 07	0.305726E 09	0.880768E 11
0.254423E 14	0.736872E 16	0.213964E 19	-0.371411E 09	0.880768E 11
0.254423E 14	0.736872E 16	0.213964E 19	0.622833E 21	-0.107014E 12

FOR DEGREE OF 1 COEFFICIENTS ARE

-0.67006E 00 -0.18956E-02

259.98	-1.1629
264.94	-1.1723
269.90	-1.1817
274.86	-1.1911
279.97	-1.2000
279.98	-1.2008
284.94	-1.2102
289.90	-1.2196
294.86	-1.2290
299.97	-1.2387
299.98	-1.2387
304.94	-1.2481
309.90	-1.2575

COS IS -0.13431

SIN IS 0.49268

BETA IS 0.03978

FOR DEGREE OF 2 COEFFICIENTS ARE

0.19369E 03 -0.13685E 01 0.23956E-02

259.98	-0.1860
264.94	-0.7367
269.90	-1.1696
274.86	-1.4845
279.97	-1.6858
279.98	-1.6860
284.94	-1.7615
289.90	-1.7190
294.86	-1.5587
299.97	-1.2703
299.98	-1.2696
304.94	-0.8697
309.90	-0.3520

COS IS -0.14368

SIN IS 0.51930

BETA IS 0.15062

FOR DEGREE OF 3 COEFFICIENTS ARE

0.23550E 02 -0.41987E-01 -0.61700E-03 0.16047E 07

259.98 -0.8706

259.98 -0.1860  
264.94 -0.7367  
269.90 -1.1696  
274.86 -1.4845  
279.97 -1.6058  
279.98 -1.6860  
284.94 -1.7615  
289.90 -1.7190  
294.86 -1.5587  
299.97 -1.2703  
299.98 -1.2696  
304.94 -0.8697  
309.90 -0.3520

COS IS -0.14368

SIN IS 0.51930

BETA IS 0.15062

FOR DEGREE OF 3 COEFFICIENTS ARE

0.23550E 02 -0.41987E-01 -0.61700E-03 0.16047E-05

259.98 -0.8706  
264.94 -1.0404  
269.90 -1.1777  
274.86 -1.2815  
279.97 -1.3521  
279.98 -1.3522  
284.94 -1.3841  
289.90 -1.3789  
294.86 -1.3354  
299.97 -1.2492  
299.98 -1.2490  
304.94 -1.1240  
309.90 -0.9572

COS IS -0.13696

SIN IS 0.50121

BETA IS 0.00557

FOR DEGREE OF 4 COEFFICIENTS ARE

0.23210E 02 -0.40151E-01 -0.61160E-03 0.15580E-05 0.69849E-10

259.98 -0.8710  
264.94 -1.0405  
269.90 -1.1776  
274.86 -1.2813  
279.97 -1.3519  
279.98 -1.3520  
284.94 -1.3840

289.90 -1.3789  
294.86 -1.3354  
299.97 -1.2494  
299.98 -1.2491  
304.94 -1.1242  
309.90 -0.9572

COS IS -0.13697  
SIN IS 0.50120  
BETA IS 0.00626

SECTION-7

X Y  
309.90 -0.8904  
314.86 -0.6486  
319.97 -0.3612  
319.98 -0.3306  
324.94 -0.0695  
329.90 0.1687  
334.86 0.3996  
339.97 0.6171  
339.98 0.6010  
344.94 0.7677  
349.90 0.8886  
354.86 0.9720  
359.97 1.0098

0.130000E 02 0.434403E 04 0.145458E 07 0.488059E 09 0.164096E 12  
0.312420E 01 0.434403E 04 0.145458E 07 0.488059E 09 0.164096E 12  
0.552844E 14 0.116365E 04 0.145458E 07 0.488059E 09 0.164096E 12  
0.552844E 14 0.186630E 17 0.429363E 06 0.488059E 09 0.164096E 12  
0.552844E 14 0.186630E 17 0.631283E 19 0.157243E 09 0.164096E 12  
0.552844E 14 0.186630E 17 0.631283E 19 0.213952E 22 0.572382E 11

FOR DEGREE OF 1 COEFFICIENTS ARE

-0.13117E 02 0.39972E-01

309.90 -0.7292  
314.86 -0.5310  
319.97 -0.3267  
319.98 -0.3263  
324.94 -0.1281  
329.90 0.0702  
334.86 0.2685  
339.97 0.4727  
339.98 0.4731  
344.94 0.6714  
349.90 0.8696  
354.86 1.0679  
359.97 1.2722

COS IS 0.13085  
SIN IS 0.00786

BETA IS 0.01784

CD = 1.04747

CL = 0.03648

FOR DEGREE OF 2 COEFFICIENTS ARE

-0.31079E 03 0.18219E 01 -0.26612E-02

309.90 -1.7642  
314.86 -0.9741  
319.97 -0.2974  
319.98 -0.2961  
324.94 0.2275  
329.90 0.6206  
334.86 0.8823  
339.97 1.0154  
339.98 1.0154  
344.94 1.0112  
349.90 0.8762  
354.86 0.6101  
359.97 0.1992

COS IS 0.13556  
SIN IS 0.00529  
BETA IS 0.00149

CD = 1.05157

CL = 0.02633

FOR DEGREE OF 4 COEFFICIENTS ARE

-0.25801E 02 0.20266E-01 0.29248E-03 0.13964E-06 -0.14814E-08

309.90 -0.9385  
314.86 -0.6248  
319.97 -0.3251  
319.98 -0.3246  
324.94 -0.0579  
329.90 0.1837  
334.86 0.3988  
339.97 0.5915  
339.98 0.5918  
344.94 0.7492  
349.90 0.8760  
354.86 0.9709  
359.97 1.0337

COS IS 0.13663

SIN IS 0.00491

BETA IS 0.00080

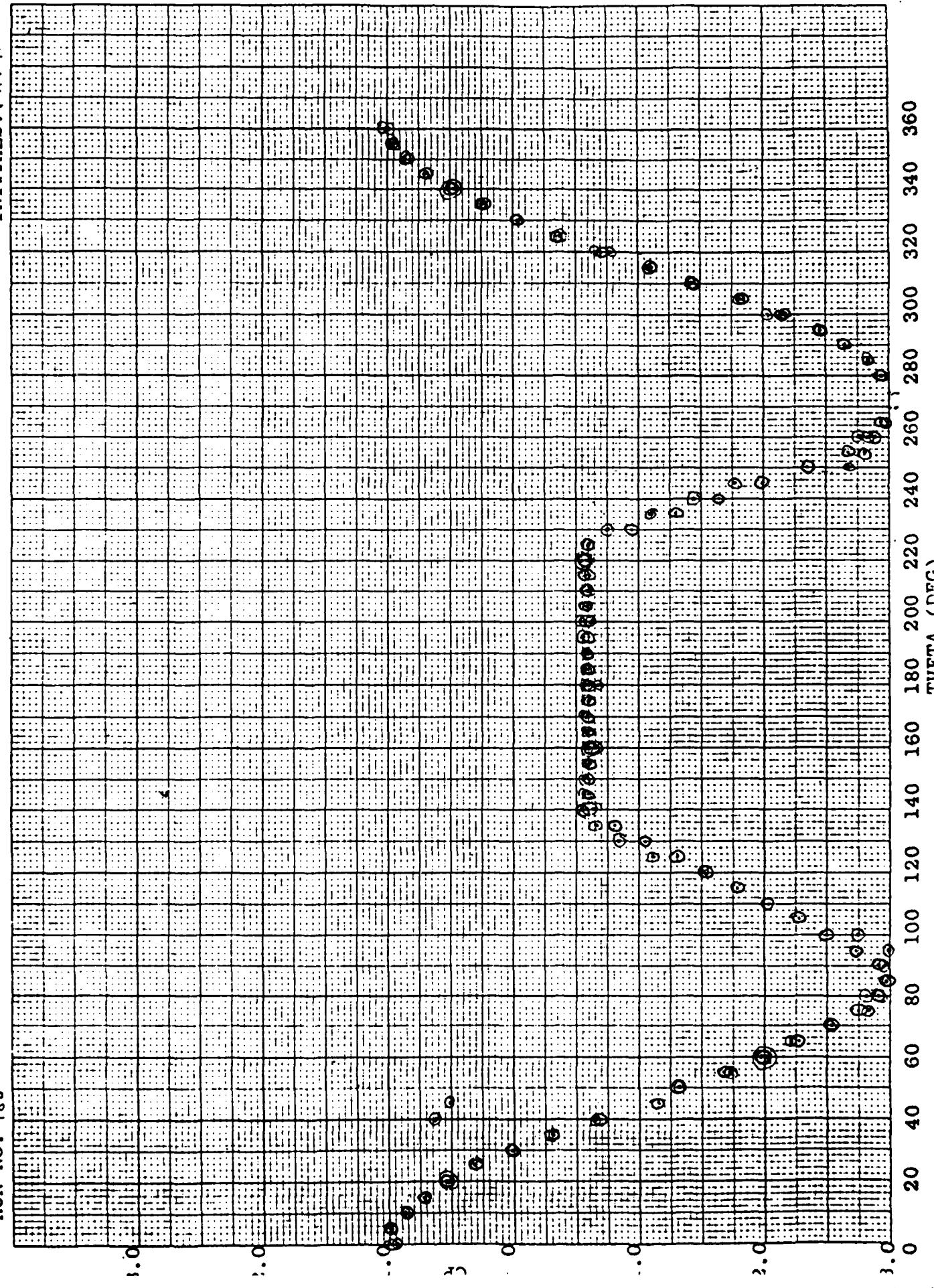
CD = 1.05021

CL = 0.02551

END OF RUN:SEQ 139:5

RUN NO: 188

INITIALS: M. M.



```
1      DIMENSION ISEQ(5)
2      REAL X(100),Y(100),C(100),B1(100),A(10,11),XN(100),SUM,BETA
3      REAL CP(100),FV
4      INTEGER N,MS,MF,MFP1,MFP2,I,J,IM1,IFT,ICDEF,JCDEF
5      CHARACTER*5 ISEQ
6      DATA MS/1/,MF/4/
7
8      PRINT *, 'RUN: SEQ'
9      READ 11,ISEQ
10     11 FORMAT(5A1)
11     PRINT 11,ISEQ
12     PRINT *,'-----'
13
14     CE=0.0
15     CL=0.0
16     CE1=0.0
17     CL1=0.0
18     CE2=0.0
19     CL2=0.0
20     CE3=0.0
21     CL3=0.0
22     DO 999 KK=1,7
23     PRINT 33
24     33 FORMAT('0')
25     IF(KK.EQ.1)THEN
26       PRINT *, 'SECTION--1'
27       N=12
28     ENDIF
29
30     IF(KK.EQ.2)THEN
31       PRINT *, 'SECTION--2'
32       N=13
33     ENDIF
34
35     IF(KK.EQ.3)THEN
36       PRINT *, 'SECTION--3'
37       N=15
38     ENDIF
39
40     IF(KK.EQ.4)THEN
41       PRINT *, 'SECTION--4'
42       N=21
43     ENDIF
44
45     IF(KK.EQ.5)THEN
46       PRINT *, 'SECTION--5'
47       N=13
48     ENDIF
49
50     IF(KK.EQ.6)THEN
51       PRINT *, 'SECTION--6'
52       N=12
53     ENDIF
54
55     IF(KK.EQ.7)THEN
56       PRINT *, 'SECTION--7'
57       N=13
58     ENDIF
```

```

C      PRINT . ' X          Y'
51     IF(KK.EQ.1)THEN
52       DO 3 I=1,N
53         READ . K1,Y(I),K2,X(I)
54         TEMP1=X(N)
55         TEMP2=Y(N)
56       ENDIF
57       IF(KK.NE.1)THEN
58         X(1)=TEMP1
59         Y(1)=TEMP2
60         DO 4 I=2,N
61           READ . K1,Y(I),K2,X(I)
62           TEMP1=X(N)
63           TEMP2=Y(N)
64         ENDIF
C
65       PRINT 1,(X(I),Y(I),I=1,N)
66 1 FORMAT(2X,F6.2,2X,F8.4)
C
67       IF(KK.EQ.1)THEN
68         XF=0.0
69         XL=X(N)
70       ELSE
71         XF=X(1)
72         XL=X(N)
73       ENDIF
C
74       IF(KK.EQ.7)THEN
75         XF=X(1)
76         XL=360.
77       ELSE
78         XL=X(N)
79       ENDIF
C
C
C      READ . MS,MF
C
80       IF(MF.GT.(N-1))THEN
81         MF=N-1
82         PRINT 200,MF
83       ENDIF
84       5 MFF1=MF+1
85       MFF2=MF+2
C
86       DO 10 I=1,N
87         XN(I)=1.0
88 10 CONTINUE
C
89       DO 30 I=1,MFF1
90         A(I,1)=0.0
91         A(I,MFF2)=0.0
92         DO 20 J=1,N
93           A(I,1)=A(I,1)+XN(J)
94           A(I,MFF2)=A(I,MFF2)+Y(J)*XN(J)
95           XN(J)=XN(J)*X(J)
96 20 CONTINUE
97 30 CONTINUE
C
98       DO 50 I=2,MFF1
99         A(MFF1,I)=0.0
100        DO 40 J=1,N
101          A(MFF1,I)=A(MFF1,I)+XN(J)
102          XN(J)=XN(J)*X(J)
103 40 CONTINUE
104 50 CONTINUE
C
105        DO 70 J=2,MFF1
106          DO 60 I=1,MF
107            A(I,J)=A(I+1,J-1)
108 60 CONTINUE
109 70 CONTINUE
C
110        PRINT . .
111        PRINT 201, ((A(I,J),J=1,MFF2),I=1,MFF1)
112        CALL LUDCMQ(A,MFF1,10)
C
113        MFP1=MFP1+1
114        DO 91 I=MFP1,MFF1
115          DO 90 J=1,I
116            C(J)=A(J,MFP2)
117 90 CONTINUE
118        CALL SOLNQ(A,C,I,10)
119        IM1=I-1
C
120        PRINT 202, THE , MFP1 , MFP2

```

```

98      DO 50 I=2,MFP1
99      A(MFP1,I)=0.0
100     DO 40 J=1,N
101      A(MFP1,J)=A(MFP1,I)+XN(J)
102      XN(J)=XN(J)*X(J)
103      40  CONTINUE
104      50  CONTINUE
C
105      DO 70 J=2,MFP1
106      DO 60 I=1,MF
107      A(I,J)=A(I+1,J-1)
108      60  CONTINUE
109      70  CONTINUE
C
110      PRINT 111
111      PRINT 201, ((A(I,J),J=1,MFP2),I=1,MFP1)
112      CALL LUDCHQ(A,MFP1,10)
C
113      MSP1=MS+1
114      DO 95 I=MSP1,MFP1
115      DO 90 J=1,I
116      C(J)=A(J,MFP2)
117      90  CONTINUE
118      CALL SOLNQ(A,C,I,10)
119      IM1=I-1
C
120      PRINT 202,IM1,(C(J),J=1,I)
121      PRINT 111
122      EXECUTE COEF
C
123      DO 300 K=1,I
124      B1(K)=C(K)
125      CALL CINTEG(XF,XL,I,B1,CE,CE1,CE2,CE3)
126      CALL SINTEG(XF,XL,I,B1,CL,CL1,CL2,CL3)
C
127      PRINT 128
128      BETA=0.0
129      DO 94 IPT =1,N
130      SUM=0.0
131      DO 93 ICOEF=2,I
132      JCOEF=I-ICOEF+2
133      SUM=(SUM+C(JCOEF))*X(IPT)
134      93  CONTINUE
135      SUM=SUM+C(1)
136      BETA=BETA+(Y(IPT)-SUM)**2
137      94  CONTINUE
138      BETA=BETA/(N-I)
139      PRINT 203,BETA
140      IF((KK.EQ.7).AND.(I.EQ.2))THEN
141      PRINT 301,CE3,CL3
142      ENDIF
143      IF((KK.EQ.7).AND.(I.EQ.3))THEN
144      PRINT 301,CE2,CL2
145      ENDIF
146      IF((KK.EQ.7).AND.(I.EQ.4))THEN
147      PRINT 301,CE,CL
148      301 FORMAT(//45X,' CD =',F10.5//,45X,' CL =',F10.5)
149      ENDIF

```

```

150      IF((KK.EQ.7).AND.(I.EQ.5))THEN
151      PRINT 301,CE1,CL1
152      ENDIF
153      95 CONTINUE
C
C
154      999 CONTINUE
C
155      200 FORMAT(' DEGREE OF POLYNOMIAL CANNOT EXCEED N - 1. ',/
156      | ' REQUESTED MAXIMUM DEGREE TOO LARGE - ',
157      | 'REDUCED TO '.I3)
158      201 FORMAT(5(3X,E13.6))
159      202 FORMAT(' FOR DEGREE OF '.I2.' COEFFICIENTS ARE'//
160      | ' .5X.6(2X,E12.5))
161      203 FORMAT(9X,' BETA IS '.F10.5//)
162      PRINT 299,ISEQ
163      299 FORMAT(/////.35X.'END OF RUN: SEQ '.5A1///)
164      STOP
C
165      REMOTE BLOCK COEF
166      DO 66 L=1,I
167      N1=I-L+1
168      CP(N1)=C(L)
169      66 CONTINUE
C
C
170      DO 55 K=1,N
171      FV=CP(1)
172      DO 49 J=2,I
173      FV=(FV*X(K))+CP(J)
174      PRINT 1,X(K),FV
175      55 CONTINUE
176      END BLOCK
177      END
C
178      SUBROUTINE LUDCHO(A,N,NDIM)
179      REAL A(NDIM,NDIM),SUM
180      INTEGER N,I,J,JM1,IM1,K
C
181      DO 30 I=1,N
182      DO 30 J=2,N
183      SUM=0.0
184      IF(J.LE.I)THEN
185      JM1=J-1
186      DO 10 K=1,JM1
187      SUM=SUM+A(I,K)*A(K,J)
188      10 CONTINUE
189      A(I,J)=A(I,J)-SUM
190      ELSE
191      IM1=I-1
192      IF(IM1.NE.0)THEN
193      DO 20 K=1,IM1
194      SUM=SUM+A(I,K)*A(K,J)
195      20 CONTINUE
196      ENDIF
C
197      IF(ABS(A(I,I)).LT. 1.0E-10)THEN
198      PRINT 100,I
199      RETURN
C
C
200      ELSE
201      A(I,J)=(A(I,J)-SUM)/A(I,I)
202      ENDIF
203      30 CONTINUE
204      RETURN
C
205      100 FORMAT(' REDUCTION NOT COMPLETED BECAUSE SMALL VALUE' ,
206      | ' FOUND FOR DIVISION IN ROW '.I3)
207      END
C
C
208      SUBROUTINE SOLNQ(A,B,N,NDIM)
209      REAL A(NDIM,NDIM),B(NDIM),SUM
210      INTEGER N,I,IM1,K,J,NM1P1,NM1P2
C
211      B(1)=B(1)/A(1,1)
212      DO 20 I=2,N
213      IM1=I-1
214      SUM=0.0
215      DO 10 K=1,IM1
216      SUM=SUM+A(I,K)*B(K)
217      10 CONTINUE
218      B(I)=(B(I)-SUM)/A(I,I)
219      20 CONTINUE
C
220      DO 40 J=2,N

```

```

197      ELSE
198          A(I,J)=(A(I,J)-SUM)/A(I,I)
199      ENDIF
200      ENDIF
201 30 CONTINUE
202      RETURN
C
203 100 FORMAT(' REDUCTION NOT COMPLETED BECAUSE SMALL VALUE',
204           ' FOUND FOR DIVISION IN ROW ',I3)
205      END
C
206      SUBROUTINE SOLNQ(A,B,N,NDIM)
207      REAL A(NDIM,NDIM),B(NDIM),SUM
208      INTEGER N,I,IM1,K,J,NMJP1,NMJP2
C
209      B(1)=B(1)/A(1,1)
210      DO 20 I=2,N
211          IM1=I-1
212          SUM=0.0
213          DO 10 K=1,IM1
214              SUM=SUM+A(I,K)*B(K)
215          10 CONTINUE
216          B(I)=(B(I)-SUM)/A(I,I)
217      20 CONTINUE
C
218      DO 40 J=2,N
219          NMJP2=N-J+2
220          NMJP1=N-J+1
221          SUM=0.0
222          DO 30 K=NJPF2,N
223              SUM=SUM+A(NMJP1,K)*B(K)
224          30 CONTINUE
225          B(NMJP1)=B(NMJP1)-SUM
226      40 CONTINUE
227      RETURN
228      END
229      SUBROUTINE CINTEG(XF,XL,J,B1,CE,CE1,CE2,CE3)
230      REAL C1(100),B1(100)
C
231      C1(1)=B1(1)
232      DO 5 K=2,J
233          C1(K)=B1(K)*(57.3**(K-1))
234      5 CONTINUE
C
235      ALPHA=0.0
236      DO 10 I=1,2
237          IF(I.EQ.1)THEN
238              XF1=XL/57.3
239          ELSE
240              XF1=XF/57.3
241          ENDIF
C
242          T1=C1(1)*SIN(XF1)
243          TB1=COS(XF1)+(XF1*SIN(XF1))
244          T2=T1+(C1(2)*TB1)
245          IF(J.EQ.2)THEN
246              TT5=0.5*T2
247          ELSE

```

-0.10961E 02 0.29356E-01

260.00 -3.3282  
264.93 -3.1835  
269.95 -3.0361  
274.90 -2.8908  
279.98 -2.7417  
280.00 -2.7411  
284.93 -2.5964  
289.95 -2.4490  
294.90 -2.3037  
300.00 -2.1540  
304.93 -2.0093  
309.95 -1.8619

COS IS -0.23871

SIN IS 1.07027

BETA IS 0.08446

FOR DEGREE OF 2 COEFFICIENTS ARE

0.74893E 02 -0.57455E 00 0.10590E-02

260.00 -2.9038  
264.93 -2.9958  
269.95 -3.0367  
274.90 -3.0246  
279.98 -2.9584  
280.00 -2.9580  
284.93 -2.8412  
289.95 -2.6694  
294.90 -2.4477  
300.00 -2.1851  
304.93 -1.8395  
309.95 -1.4550

COS IS -0.24258

SIN IS 1.08253

BETA IS 0.00384

FOR DEGREE OF 3 COEFFICIENTS ARE

0.50174E 02 -0.23041E 00 -0.44174E-03 0.20936E-05

260.00 -2.7956  
264.93 -2.9415  
269.95 -3.0291  
274.90 -3.0536  
279.98 -3.0132  
280.00 -3.0129

284.93 -2.9085  
289.95 -2.7348  
294.90 -2.4955  
300.00 -2.1767  
304.93 -1.7971  
309.95 -1.3371

COS IS -0.24399

SIN IS 1.08591

BETA IS 0.00529

FOR DEGREE OF 4 COEFFICIENTS ARE

0.16267E 01 0.75734E-01 -0.27532E-03 -0.19674E-05 0.63405E-08

260.00 -2.8976  
264.93 -2.9796  
269.95 -3.0215  
274.90 -3.0181  
279.98 -2.9646  
280.00 -2.9643  
284.93 -2.8602  
289.95 -2.6974

260.00 -3.1632

COS IS 0.23453

SIN IS 0.51767

BETA IS 0.06150

FOR DEGREE OF 4 COEFFICIENTS ARE

-0.53957E 01 0.14171E 00 -0.89978E-03 0.24201E-05 -0.35701E-03

220.00 -0.3633

224.93 -0.6420

229.95 -0.9433

234.90 -1.2584

239.98 -1.6009

240.00 -1.6023

244.93 -1.9541

245.02 -1.9607

246.02 -2.0345

248.02 -2.1846

249.95 -2.3326

254.90 -2.7267

260.00 -3.1554

COS IS 0.23453

SIN IS 0.51766

BETA IS 0.06976

SECTION--6

X Y

260.00 -2.8434

264.93 -2.9391

269.95 -3.0253

274.90 -3.1613

279.98 -2.9364

280.00 -3.0340

284.93 -2.8386

289.95 -2.6459

294.90 -2.4598

309.00 -2.1777

304.93 -1.8085

309.95 -1.4258

0.120000E 02 0.341442E 04 0.974293E 06 0.278800E 09 0.800056E 11  
-0.312957E 02 0.341442E 04 0.974293E 06 0.278800E 09 0.800056E 11  
0.230228E 14 -0.662338E 04 0.974293E 06 0.278800E 09 0.800056E 11  
0.230228E 14 0.664337E 16 -0.249385E 07 0.278800E 09 0.800056E 11  
0.230228E 14 0.664337E 16 0.192218E 19 -0.706637E 09 0.800056E 11  
0.230228E 14 0.664337E 16 0.192218E 19 0.557638E 21 -0.200732E 12

FOR DEGREE OF 1 COEFFICIENTS ARE

240.00 -1.6516  
244.93 -1.9930  
245.02 -1.9992  
246.02 -2.0684  
248.02 -2.2069  
249.95 -2.3405  
254.90 -2.6832  
260.00 -3.0363

COS IS 0.23447

SIN IS 0.51687

BETA IS 0.05459

FOR DEGREE OF 2 COEFFICIENTS ARE

-0.77540E 01 0.12095E 00 -0.39714E-03

220.00 -0.3667  
224.93 -0.6415  
229.95 -0.9412  
234.90 -1.2563  
239.98 -1.5992  
240.00 -1.6013  
244.93 -1.9545  
245.02 -1.9611  
246.02 -2.0352  
248.02 -2.1857  
249.95 -2.3339  
254.90 -2.7277  
260.00 -3.1537

COS IS 0.23446

SIN IS 0.51759

BETA IS 0.05515

FOR DEGREE OF 3 COEFFICIENTS ARE

-0.38061E 01 0.64440E-01 -0.13207E-03 -0.40872E-06

220.00 -0.3735  
224.93 -0.6447  
229.95 -0.9412  
234.90 -1.2540  
239.98 -1.5964  
240.00 -1.5978  
244.93 -1.9512  
245.02 -1.9579  
246.02 -2.0322  
248.02 -2.1835  
249.95 -2.3327  
254.90 -2.7305

260.00 -3.1632

COS IS 0.23453

SIN IS 0.51767

BETA IS 0.06150

FOR DEGREE OF 4 COEFFICIENTS ARE

-0.53957E 01 0.14171E 00 -0.89978E-03 0.24201E-05 -0.35701E-08

220.00 -0.3633  
224.93 -0.6420  
229.95 -0.9433  
234.90 -1.2584  
239.98 -1.6009  
240.00 -1.6023  
244.93 -1.9541  
245.02 -1.9607  
246.02 -2.0345  
248.02 -2.1846  
249.95 -2.3326  
254.90 -2.7267  
260.00 -3.1554

154.90 -0.6029  
159.98 -0.6024  
160.00 -0.6024  
164.93 -0.6013  
169.95 -0.5999  
174.90 -0.5982  
179.98 -0.5962  
180.00 -0.5962  
184.93 -0.5942  
189.95 -0.5922  
194.90 -0.5902  
199.98 -0.5882  
200.00 -0.5882  
204.93 -0.5864  
209.95 -0.5846  
214.90 -0.5831  
219.98 -0.5816  
220.00 -0.5816

COS IS 0.38233

SIN IS -0.00194

BETA IS 0.00146

0 SECTION--5

X Y  
220.00 -0.5991  
224.93 -0.6040  
229.95 -0.7473  
234.90 -1.1111  
239.98 -1.4437  
240.00 -1.4393  
244.93 -1.7648  
245.02 -1.9890  
246.02 -2.2410  
248.02 -2.4910  
249.95 -2.6648  
254.90 -2.8203  
260.00 -2.8434

0.130000E 02	0.313860E 04	0.759353E 06	0.184097E 09	0.447222E 11
-0.227588E 02	0.313860E 04	0.759353E 06	0.184097E 09	0.447222E 11
0.108856E 14	-0.560537E 04	0.759353E 06	0.184097E 09	0.447222E 11
0.108856E 14	0.265466E 16	-0.138252E 07	0.184097E 09	0.447222E 11
0.108856E 14	0.265466E 16	0.648597E 18	-0.341450E 09	0.447222E 11
0.108856E 14	0.265466E 16	0.648597E 18	0.158754E 21	-0.844416E 11

FOR DEGREE OF 1 COEFFICIENTS ARE

0.14965E 02 -0.69235E-01

220.00 -0.2669  
224.93 -0.6083  
229.95 -0.9558  
234.90 -1.2985  
239.98 -1.6502

189.95 -0.5934  
194.90 -0.5916  
199.98 -0.5895  
200.00 -0.5895  
204.93 -0.5874  
209.95 -0.5851  
214.90 -0.5826  
219.98 -0.5799  
220.00 -0.5799

COS IS 0.38237

SIN IS -0.00185

BETA IS 0.00130

FOR DEGREE OF 3 COEFFICIENTS ARE

0.38463E 00 -0.16621E-01 0.91262E-04 -0.16226E-06

140.00 -0.5989  
144.93 -0.6013  
149.95 -0.6028  
154.90 -0.6033  
159.98 -0.6031  
160.00 -0.6031  
164.93 -0.6022  
169.95 -0.6007  
174.90 -0.5988  
179.98 -0.5966  
180.00 -0.5966  
184.93 -0.5943  
189.95 -0.5918  
194.90 -0.5894  
199.98 -0.5872  
200.00 -0.5872  
204.93 -0.5853  
209.95 -0.5839  
214.90 -0.5829  
219.98 -0.5827  
220.00 -0.5827

COS IS 0.38230

SIN IS -0.00199

BETA IS 0.00137

FOR DEGREE OF 4 COEFFICIENTS ARE

0.79855E 00 -0.28190E-01 0.20703E-03 -0.65896E-06 0.77610E-09

140.00 -0.6003  
144.93 -0.6020  
149.95 -0.6029

154.90 -0.6029  
159.98 -0.6024  
160.00 -0.6024  
164.93 -0.6013  
169.95 -0.5999  
174.90 -0.5982  
179.98 -0.5962  
180.00 -0.5962  
184.93 -0.5942  
189.95 -0.5922  
194.90 -0.5902  
199.98 -0.5882  
200.00 -0.5882  
204.93 -0.5864  
209.95 -0.5846  
214.90 -0.5831  
219.98 -0.5816  
220.00 -0.5816

COS IS 0.38233

SIN IS -0.00194

BETA IS 0.00146

220.00 -0.5991

0.210000E 02	0.381904E 04	0.707051E 06	0.133132E 09	0.254634E 11
-0.124747E 02	0.381904E 04	0.707051E 06	0.133132E 09	0.254634E 11
0.494047E 13	-0.226494E 04	0.707051E 06	0.133132E 09	0.254634E 11
0.494047E 13	0.971017E 15	-0.418649E 06	0.133132E 09	0.254634E 11
0.494047E 13	0.971017E 15	0.193059E 18	-0.787047E 08	0.254634E 11
0.494047E 13	0.971017E 15	0.193059E 18	0.387782E 20	-0.150312E 11

FOR DEGREE OF 1 COEFFICIENTS ARE

-0.64772E 00 0.29520E-03

140.00	-0.6064
144.93	-0.6049
149.95	-0.6035
154.90	-0.6020
159.98	-0.6005
160.00	-0.6005
164.93	-0.5990
169.95	-0.5975
174.90	-0.5961
179.98	-0.5946
180.00	-0.5946
184.93	-0.5931
189.95	-0.5916
194.90	-0.5902
199.98	-0.5887
200.00	-0.5887
204.93	-0.5872
209.95	-0.5857
214.90	-0.5843
219.98	-0.5828
220.00	-0.5828

COS IS 0.38217

SIN IS -0.00191

BETA IS 0.00124

FOR DEGREE OF 2 COEFFICIENTS ARE

-0.54153E 00 -0.89604E-03 0.32806E-05

140.00	-0.6027
144.93	-0.6025
149.95	-0.6021
154.90	-0.6016
159.98	-0.6009
160.00	-0.6009
164.93	-0.6001
169.95	-0.5991
174.90	-0.5979
179.98	-0.5965
180.00	-0.5965
184.93	-0.5950

COS IS 0.22883

SIN IS -0.47532

BETA IS 0.06018

FOR DEGREE OF 4 COEFFICIENTS ARE

-0.10469E 03 0.13548E 01 0.85128E-02 -0.18612E-03 0.67304E-06

100.00 -2.8969  
104.93 -2.2372  
106.02 -2.1305  
109.95 -1.8447  
110.50 -1.8156  
114.02 -1.6801  
114.90 -1.6577  
118.02 -1.6038  
119.98 -1.5827  
120.00 -1.5826  
124.93 -1.5272  
129.95 -1.3801  
134.90 -1.0303  
139.98 -0.3289  
140.00 -0.3253

COS IS 0.24490

SIN IS -0.49268

BETA IS 0.20830

SECTION--4

X	Y
140.00	-0.6346
144.93	-0.5621
149.95	-0.5590
154.90	-0.6074
159.98	-0.6115
160.00	-0.6551
164.93	-0.5929
169.95	-0.5801
174.90	-0.6181
179.98	-0.5785
180.00	-0.6663
184.93	-0.5706
189.95	-0.5689
194.90	-0.5524
199.98	-0.5362
200.00	-0.6327
204.93	-0.5929
209.95	-0.6024
214.90	-0.6071
219.98	-0.5468

220.00 -0.5991

0.210000E 02	0.381904E 04	0.707051E 06	0.133132E 09	0.254634E 11
-0.124747E 02	0.381904E 04	0.707051E 06	0.133132E 09	0.254634E 11
0.494047E 13	-0.226494E 04	0.707051E 06	0.133132E 09	0.254634E 11
0.494047E 13	0.971017E 15	-0.418649E 06	0.133132E 09	0.254634E 11
0.494047E 13	0.971017E 15	0.193059E 18	-0.787047E 08	0.254634E 11
0.494047E 13	0.971017E 15	0.193059E 18	0.307732E 20	-0.150312E 11

FOR DEGREE OF 1 COEFFICIENTS ARE

-0.64772E 00 0.29520E-03

140.00 -0.6064  
144.93 -0.6049  
149.95 -0.6035  
154.90 -0.6020  
159.98 -0.6005  
160.00 -0.6005  
164.93 -0.5990  
169.95 -0.5975  
174.90 -0.5961  
179.98 -0.5946  
180.00 -0.5946  
184.93 -0.5931  
189.95 -0.5916  
194.90 -0.5902  
199.98 -0.5812

134.90 -0.7969  
139.98 -0.5452  
140.00 -0.5442

COS IS 0.22802  
SIN IS -0.47461  
BETA IS 0.05512

FOR DEGREE OF 2 COEFFICIENTS ARE

-0.29429E 01 -0.26062E-01 0.31168E-03

100.00 -2.4322  
104.93 -2.2458  
106.02 -2.2026  
109.95 -2.0405  
110.50 -2.0170  
114.02 -1.8624  
114.90 -1.8226  
118.02 -1.6774  
119.98 -1.5831  
120.00 -1.5821  
124.93 -1.3342  
129.95 -1.0663  
134.90 -0.7866  
139.98 -0.4838  
140.00 -0.4826

COS IS 0.22960  
SIN IS -0.47606  
BETA IS 0.05723

FOR DEGREE OF 3 COEFFICIENTS ARE

0.41541E 01 -0.21062E 00 0.18986E-02 -0.45106E-05

100.00 -2.4321  
104.93 -2.2528  
106.02 -2.2099  
109.95 -2.0463  
110.50 -2.0224  
114.02 -1.8636  
114.90 -1.8225  
118.02 -1.6725  
119.98 -1.5753  
120.00 -1.5743  
124.93 -1.3207  
129.95 -1.0521  
134.90 -0.7804  
139.98 -0.4978  
140.00 -0.4967

64.93 -2.2829  
69.95 -2.5509  
74.90 -2.7661  
79.98 -2.9179  
84.93 -2.9814  
89.95 -2.9433  
96.25 -2.7240  
99.98 -2.4918  
100.00 -2.4903

COS IS -0.23097

SIN IS -1.03075

BETA IS 0.02739

SECTION--3

X Y  
400.00 -2.1593  
104.93 -1.9954  
106.02 -2.7490  
109.95 -1.8983  
110.50 -2.2450  
114.02 -1.9790  
114.90 -1.8296  
118.02 -1.7410  
119.98 -1.6687  
120.00 -1.5089  
124.93 -1.1188  
129.95 -0.8382  
134.90 -0.6624  
139.98 -0.5910  
140.00 -0.6346

0.150000E 02 0.178808E 04 0.215363E 06 0.262097E 08 0.322273E 10  
-0.236191E 02 0.178808E 04 0.215363E 06 0.262097E 08 0.322273E 10  
0.400289E 12 -0.270579E 04 0.215363E 06 0.262097E 08 0.322273E 10  
0.400289E 12 0.502083E 14 -0.312393E 06 0.262097E 08 0.322273E 10  
0.400289E 12 0.502083E 14 0.635705E 16 -0.363624E 08 0.322273E 10  
0.400289E 12 0.502083E 14 0.635705E 16 0.812088E 18 -0.426871E 10

FOR DEGREE OF 1 COEFFICIENTS ARE

-0.74811E 01 0.49549E-01

100.00 -2.5262  
104.93 -2.2819  
106.02 -2.2279  
109.95 -2.0332  
110.50 -2.0059  
114.02 -1.8315  
114.90 -1.7879  
118.02 -1.6333  
119.98 -1.5362  
120.00 -1.5352  
124.93 -1.2910  
129.95 -1.0422

134.90 -0.7969  
139.98 -0.5452  
140.00 -0.5442

COS IS 0.22802

SIN IS -0.47461

BETA IS 0.05512

FOR DEGREE OF 2 COEFFICIENTS ARE

-0.29429E 01 -0.26062E-01 0.31168E-03

100.00 -2.4322  
104.93 -2.2458  
106.02 -2.2026  
109.95 -2.0405  
110.50 -2.0170  
114.02 -1.8624  
114.90 1.0226  
118.02 -1.6774  
119.98 -1.5031  
120.00 -1.5021  
124.93 -1.3342

FOR DEGREE OF 2 COEFFICIENTS ARE

0.69994E 01 -0.23416E 00 0.13862E-02

49.95 -1.2385  
54.90 -1.6782  
59.98 -2.0588  
60.00 -2.0601  
64.93 -2.3608  
69.95 -2.5977  
74.90 -2.7629  
79.98 -2.8619  
84.93 -2.8894  
89.95 -2.8480  
96.25 -2.6972  
99.98 -2.5560  
100.00 -2.5552

COS IS -0.23273

SIN IS -1.02500

BETA IS 0.02785

FOR DEGREE OF 3 COEFFICIENTS ARE

-0.22492E 01 0.15382E 00 -0.38861E-02 0.23238E-04

49.95 -1.3658  
54.90 -1.6721  
59.98 -1.9894  
60.00 -1.9906  
64.93 -2.2841  
69.95 -2.5507  
74.90 -2.7649  
79.98 -2.9165  
84.93 -2.9804  
89.95 -2.9434  
96.25 -2.7247  
99.98 -2.4918  
100.00 -2.4904

COS IS -0.23098

SIN IS -1.03075

BETA IS 0.02428

FOR DEGREE OF 4 COEFFICIENTS ARE

-0.30959E 01 0.19983E 00 -0.48040E-02 0.31217E-04 -0.25545E-07

49.95 -1.3691  
54.90 -1.6712  
59.98 -1.9875  
60.00 -1.9888

COS IS 0.08540  
SIN IS -0.04630  
BETA IS 0.00075

0 SECTION--2

X	Y
49.95	-1.3255
54.90	-1.7330
59.98	-2.0231
60.00	-1.9790
64.93	-2.2224
69.95	-2.5410
74.90	-2.8410
79.98	-2.9128
84.93	-2.8721
89.95	-2.9584
96.25	-2.8509
99.98	-2.7463
100.00	-2.1593

0.13000E 02	0.985699E 03	0.783864E 05	0.650114E 07	0.558554E 09
-0.311647E 02	0.985699E 03	0.783864E 05	0.650114E 07	0.558554E 09
0.493801E 11	-0.244417E 04	0.783864E 05	0.650114E 07	0.558554E 09
0.493801E 11	0.446535E 13	-0.199415E 06	0.650114E 07	0.558554E 09
0.493801E 11	0.446535E 13	0.410992E 15	-0.148366E 00	0.550554E 09
0.493801E 11	0.446535E 13	0.410992E 15	0.383528E 17	-0.146288E 10

FOR DEGREE OF 1 COEFFICIENTS ARE

-0.71006E 00 -0.22252E-01

49.95	-1.8216
54.90	-1.9317
59.98	-2.0447
60.00	-2.0452
64.93	-2.1549
69.95	-2.2666
74.90	-2.3767
79.98	-2.4898
84.93	-2.5999
89.95	-2.7116
96.25	-2.8518
99.98	-2.9348
100.00	-2.9353

COS IS -0.22735

SIN IS -0.98062

BETA IS 0.13976

FOR DEGREE OF 2 COEFFICIENTS ARE

0.69994E 01 -0.23416E 00 0.13862E-02

49.95	-1.2385
54.90	-1.6782
59.98	-2.0588
60.00	-2.0601
64.93	-2.3608
69.95	-2.5977
74.90	-2.7629
79.98	-2.8619
84.93	-2.8894
89.95	-2.8430
96.25	-2.6972
99.98	-2.5560
100.00	-2.5552

COS IS -0.23273

SIN IS -1.02500

BETA IS 0.02785

FOR DEGREE OF 3 COEFFICIENTS ARE

17.79 0.5095  
20.00 0.5086  
24.93 0.2790  
29.95 0.0121  
34.90 -0.2838  
39.98 -0.6212  
42.02 -0.7663  
46.91 -1.1365  
49.95 -1.3827

COS IS 0.08726

SIN IS -0.04478

BETA IS 0.00244

FOR DEGREE OF 3 COEFFICIENTS ARE

0.94910E 00 0.11227E-01 -0.18851E-02 0.14941E-04

4.93 0.9604  
9.95 0.8889  
14.90 0.7473  
19.98 0.5400  
20.00 0.5391  
24.93 0.2889  
29.95 -0.0042  
34.90 -0.3201  
39.98 -0.6605  
42.02 -0.7992  
46.91 -1.1303  
49.95 -1.3315

COS IS 0.08262

SIN IS -0.04609

BETA IS 0.00116

FOR DEGREE OF 4 COEFFICIENTS ARE

0.11256E 01 -0.33919E-01 0.13935E-02 -0.73965E-04 0.80349E-06

4.93 0.9838  
9.95 0.8611  
14.90 0.7245  
19.98 0.5423  
20.00 0.5414  
24.93 0.3104  
29.95 0.0191  
34.90 -0.3130  
39.98 -0.6770  
42.02 -0.8220  
46.91 -1.1435  
49.95 -1.3081

RUN:SEQ

188.5

-----

0

SECTION--1

X	Y
4.93	0.9808
9.95	0.8696
14.90	0.7194
19.98	0.5304
20.00	0.5438
24.93	0.3225
29.95	0.0226
34.90	-0.3210
39.98	-0.6518
42.02	-0.8690
46.91	-1.1029
49.95	-1.3255

0.120000E 02	0.338400E 03	0.119407E 05	0.471208E 06	0.197934E 08
-0.281103E 00	0.338400E 03	0.119407E 05	0.471208E 06	0.197934E 08
0.863967E 09	-0.137326E 03	0.119407E 05	0.471208E 06	0.197934E 08
0.863967E 09	0.386842E 11	-0.778169E 04	0.471208E 06	0.197934E 08
0.863967E 09	0.386842E 11	0.176363E 13	-0.381274E 06	0.197934E 08
0.863967E 09	0.386842E 11	0.176363E 13	0.814980E 14	-0.180838E 09

FOR DEGREE OF 1 COEFFICIENTS ARE

0.14984E 01 -0.53966E-01

4.93	1.2324
9.95	0.9614
14.90	0.6943
19.98	0.4202
20.00	0.4191
24.93	0.1530
29.95	-0.1179
34.90	-0.3850
39.98	-0.6591
42.02	-0.7692
46.91	-1.0331
49.95	-1.1972

COS IS 0.09300

SIN IS -0.04906

BETA IS 0.01839

FOR DEGREE OF 2 COEFFICIENTS ARE

0.11100E 01 -0.16827E-01 -0.66218E-03

4.93	1.0110
9.95	0.8770
14.90	0.7123

19.98	0.5095
20.00	0.5086
24.93	0.2790
29.95	0.0121
34.90	-0.2838
39.98	-0.6212
42.02	-0.7663
46.91	-1.1365
49.95	-1.3827

COS IS 0.08726

SIN IS -0.04478

BETA IS 0.00244

FOR DEGREE OF 3 COEFFICIENTS ARE

0.94910E 00 0.11227E-01 -0.18851E-02 0.14241E-04

4.93	0.9604
9.95	0.8889
14.90	0.7473
19.98	0.5400
20.00	0.5391

```

247      TB2=(2.*XF1)*COS(XF1)
248      TB3=TB2+(((XF1**2)-2.)*SIN(XF1))
249      T3=T2+(C1(3)*TB3)
250      ENDIF
251      IF(J.EQ.3)THEN
252          TT5=0.5*T3
253      ENDIF
254      IF((J.NE.2).AND.(J.NE.3))THEN
255          TB4=((3.*(XF1**2))-6.)*COS(XF1)
256          TB5=TB4+((XF1**3)-(6.*XF1))*SIN(XF1)
257          T4=T3+(C1(4)*TB5)
258      ENDIF
259      IF(J.EQ.4)THEN
260          TT5=0.5*T4
261      ENDIF
262      IF(J.EQ.5)THEN
263          T5=((XF1**4)-(12.*(XF1**2))+24.)*SIN(XF1)
264          T6=((4.*(XF1**3))-(24.*XF1))*COS(XF1)
265          T7=((T5+T6)*C1(5))
266          T8=T4+T7
267          TT5=0.5*T8
268      ENDIF
269      IF(I.EQ.1)THEN
270          SUM2=TT5
271      ENDIF
272      IF(I.EQ.2)THEN
273          SUM1=TT5
274      ENDIF
275 10 CONTINUE
C
276      ALPHA=SUM2-SUM1
277      PRINT 1
278      PRINT 66,ALPHA
279 66 FORMAT(9X,' COS IS ',F10.5)
280      IF(J.EQ.2)THEN
281          CE3=CE3+ALPHA
282      ENDIF
283      IF(J.EQ.3)THEN
284          CE2=CE2+ALPHA
285      ENDIF
286      IF(J.EQ.4)THEN
287          CE=CE+ALPHA
288      ENDIF
289      IF(J.EQ.5)THEN
290          CE1=CE1+ALPHA
291      ENDIF
292      RETURN
293
294      SUBROUTINE SINTEG(XF,XL,J,B1,CL,CL1,CL2,CL3)
295      REAL C1(100),B1(100)
C
296      C1(1)=B1(1)
297      DO 5 K=2,J
298          C1(K)=B1(K)*(57.3***(K-1))
299 5 CONTINUE
C
300      ALPHA=0.0
301      DO 10 I=1,2
302          IF(I.EQ.1)THEN
C
303              XF1=XL/57.3
304          ELSE
305              XF1=XF/57.3
306          ENDIF
C
307          T1=C1(1)*(-COS(XF1))
308          TB1=SIN(XF1)-(XF1*COS(XF1))
309          T2=T1+(C1(2)*TB1)
310          IF(J.EQ.2)THEN
311              TT5=0.5*T2
312          ELSE
313              TB2=(2.*XF1)*SIN(XF1)
314              TB3=TB2+((2.-(XF1**2))*COS(XF1))
315              T3=T2+(C1(3)*TB3)
316          ENDIF
317          IF(J.EQ.3)THEN
318              TT5=0.5*T3
319          ENDIF
320          IF((J.NE.2).AND.(J.NE.3))THEN
321              TB4=((3.*(XF1**2))-6.)*SIN(XF1)
322              TB5=TB4+((6.*XF1)-(XF1**3))*COS(XF1)
323              T4=T3+(C1(4)*TB5)
324          ENDIF
325          IF(J.EQ.4)THEN
326              TT5=0.5*T4
327          ENDIF
328          IF(J.EQ.5)THEN
329              TB6=(4.*XF1)-(XF1**4)-(C1(5)*SIN(XF1))

```

284.93 -2.9085  
289.95 -2.7348  
294.90 -2.4955  
300.00 -2.1767  
304.93 -1.7971  
309.95 -1.3371

COS IS -0.24399  
SIN IS 1.08591  
BETA IS 0.00529

FOR DEGREE OF 4 COEFFICIENTS ARE

0.16267E 01 0.75734E-01 -0.27532E-03 -0.19694E-05 0.63405E-08

260.00 -2.8976  
264.93 -2.9796  
269.95 -3.0215  
274.90 -3.0181  
279.98 -2.9646  
280.00 -2.9643  
284.93 -2.8602  
289.95 -2.6974  
294.90 -2.4771  
300.00 -2.1836  
304.93 -1.8317  
309.95 -1.4002

COS IS -0.24343  
SIN IS 1.08374  
BETA IS 0.00506

SECTION-7

X Y  
309.95 -1.4258  
314.90 -1.1091  
319.98 -0.6623  
320.00 -0.7666  
324.93 -0.3804  
329.95 -0.0443  
334.90 0.2482  
339.98 0.5685  
340.00 0.4654  
344.93 0.7017  
349.95 0.8582  
354.90 0.9487  
359.98 0.9937

0.130000E 02 0.434435E 04 0.145479E 07 0.488166E 09 0.164143E 12  
0.336103E 00 0.434435E 04 0.145479E 07 0.488166E 09 0.164143E 12  
0.553042E 14 0.264441E 03 0.145479E 07 0.488166E 09 0.164143E 12

0.553042E 14 0.186710E 17 0.139033E 06 0.488166E 09 0.164143E 12  
0.553042E 14 0.186710E 17 0.631595E 19 0.633965E 08 0.164143E 12  
0.553042E 14 0.186710E 17 0.631595E 19 0.214073E 22 0.268674E 11

FOR DEGREE OF 1 COEFFICIENTS ARE

-0.16965E 02 0.50843E-01

309.95 -1.2061  
314.90 -0.9544  
319.98 -0.6961  
320.00 -0.6951  
324.93 -0.4445  
329.95 -0.1892  
334.90 0.0624  
339.98 0.3207  
340.00 0.3217  
344.93 0.5724  
349.95 0.8276  
354.90 1.0793  
359.98 1.3376

COS IS 0.05899

SIN IS 0.06002

BETA IS 0.03154

CD = 0.53059

CL = 0.14095

FOR DEGREE OF 2 COEFFICIENTS ARE

0.40378E 03 -0.24668E 01 0.37584E-02

309.95 0.2720  
314.90 -0.3135  
319.98 -0.7231  
320.00 -0.7244  
324.93 -0.9358  
329.95 -0.9631  
334.90 -0.8047  
339.98 -0.4504  
340.00 -0.4485  
344.93 0.0811  
349.95 0.8083  
354.90 1.7109  
359.98 2.8289

COS IS 0.01991

SIN IS 0.07910

BETA IS 1.18737

CD = 0.47831

CL = 0.13153

FOR DEGREE OF 3 COEFFICIENTS ARE

-0.32500E 02 -0.28570E-02 0.73895E-03 -0.13105E-05

309.95 -1.4192  
314.90 -1.0475  
319.98 -0.6914  
320.00 -0.6900  
324.93 -0.3701  
329.95 -0.0714  
334.90 0.1957  
339.98 0.4404  
340.00 0.4413  
344.93 0.6491  
349.95 0.8299  
354.90 0.9767  
359.93 1.0939

COS IS 0.06483

SIN IS 0.05101

CD = 0.47031

CL = 0.13153

FOR DEGREE OF 3 COEFFICIENTS ARE

-0.32500E 02 -0.28570E-02 0.73895E-03 -0.13105E-05

309.95	-1.4192
314.90	-1.0475
319.98	-0.6914
320.00	-0.6900
324.93	-0.3701
329.95	-0.0714
334.90	0.1957
339.98	0.4404
340.00	0.4413
344.93	0.6491
349.95	0.8299
354.90	0.9767
359.98	1.0939

COS IS 0.06483

SIN IS 0.05681

BETA IS 0.00375

CD = 0.51814

CL = 0.10625

FOR DEGREE OF 4 COEFFICIENTS ARE

-0.18050E 02 -0.42054E-01 0.17407E-03 0.15676E-05 -0.36601E-08

309.95	-1.4655
314.90	-1.0732
319.98	-0.6972
320.00	-0.6958
324.93	-0.3591
329.95	-0.0471
334.90	0.2277
339.98	0.4733
340.00	0.4742
344.93	0.6747
349.95	0.8380
354.90	0.9561
359.98	1.0303

COS IS 0.06646

SIN IS 0.05631

BETA IS 0.00173

CD = 0.53922

CL = 0.08604

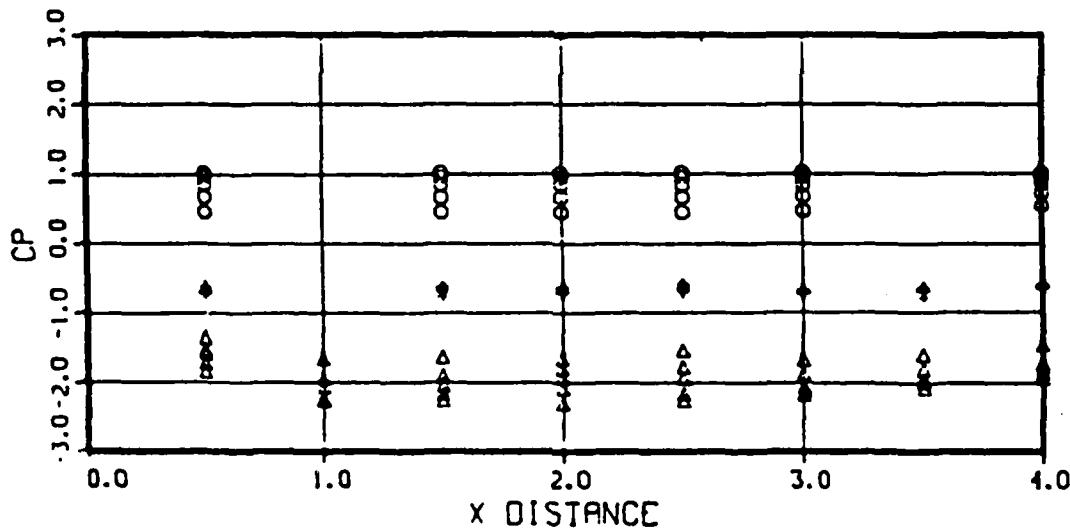
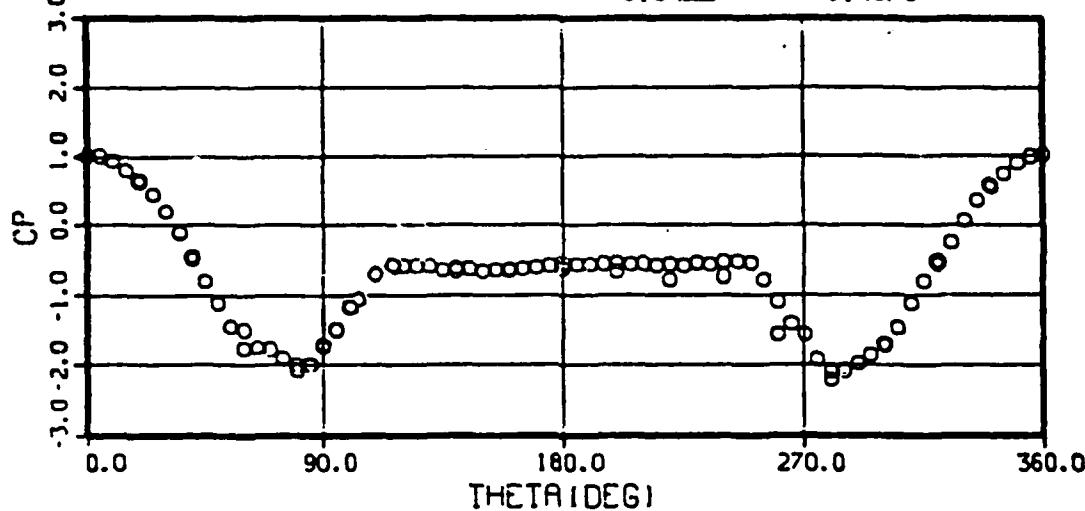
END OF RUN: SEQ 188.5

APPENDIX B

STEADY PRESSURE DATA PLOTS  
FOR  
SMOOTH & ROUGH CYLINDERS  
TESTS

SMOOTH CYLINDER

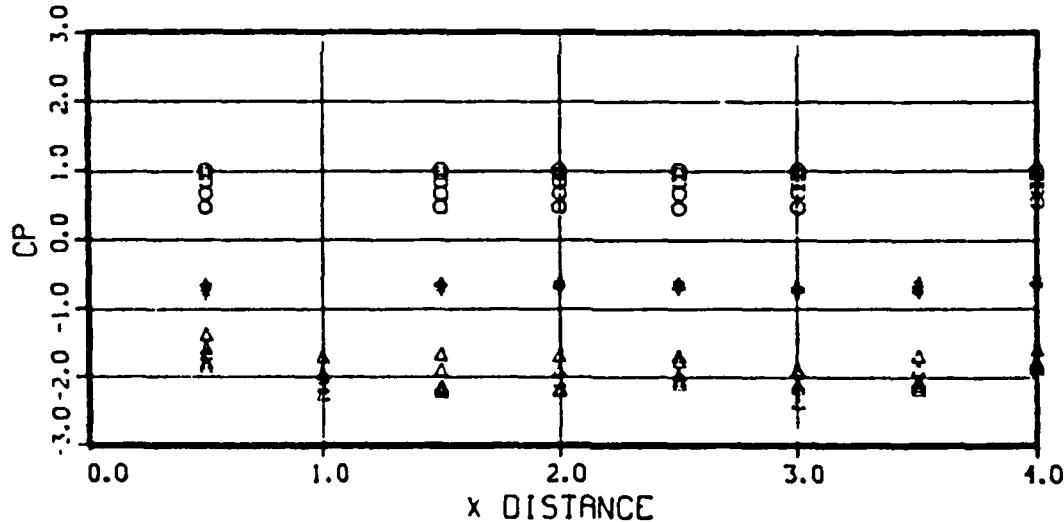
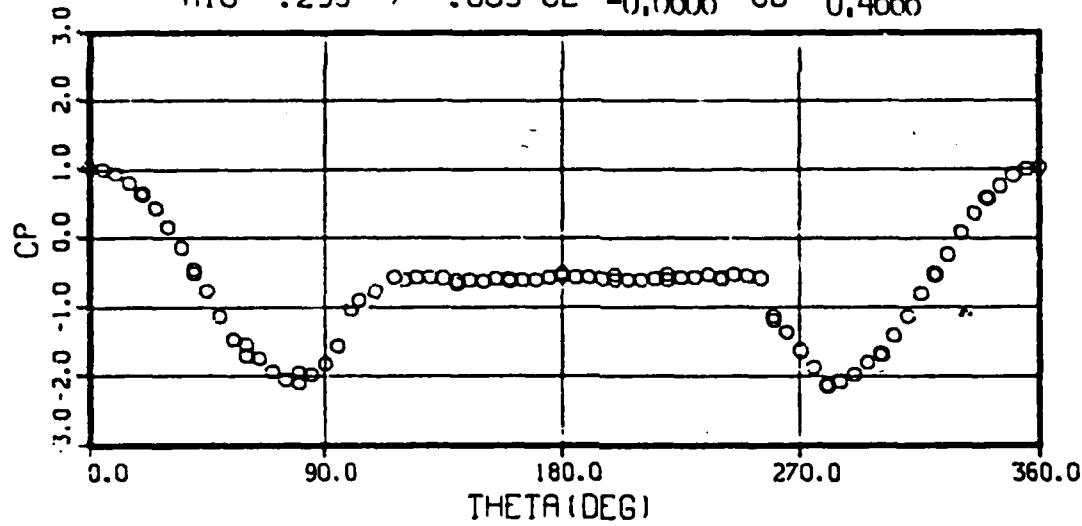
RUN 005 OIU-387.8 +/- 3.48 RNDIU-7.760 +/- .122  
PIU- 9994. +/- 41.40 VIU-268.48 +/- 1.624  
MIU- .235 +/- .002 CL- -0.0421 CD- 0.4976



CP VALUES ALONG LONGITUDINAL RAYS AT  
POLAR ANGLE OF 4DEG-0 64DEG-+ 124DEG-X.  
THE 5 SETS OF POINTS AT EACH LOCATION  
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

SMOOTH CYLINDER

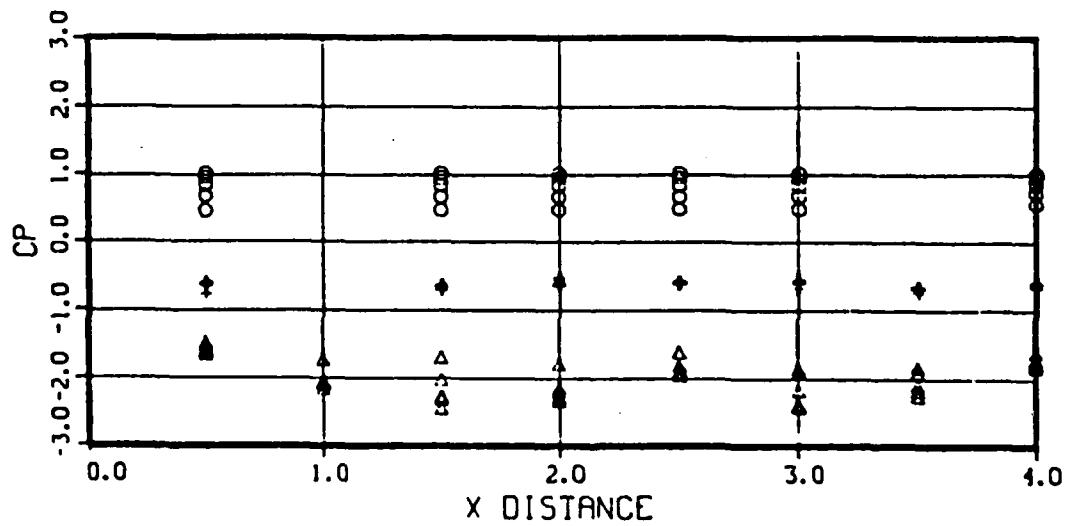
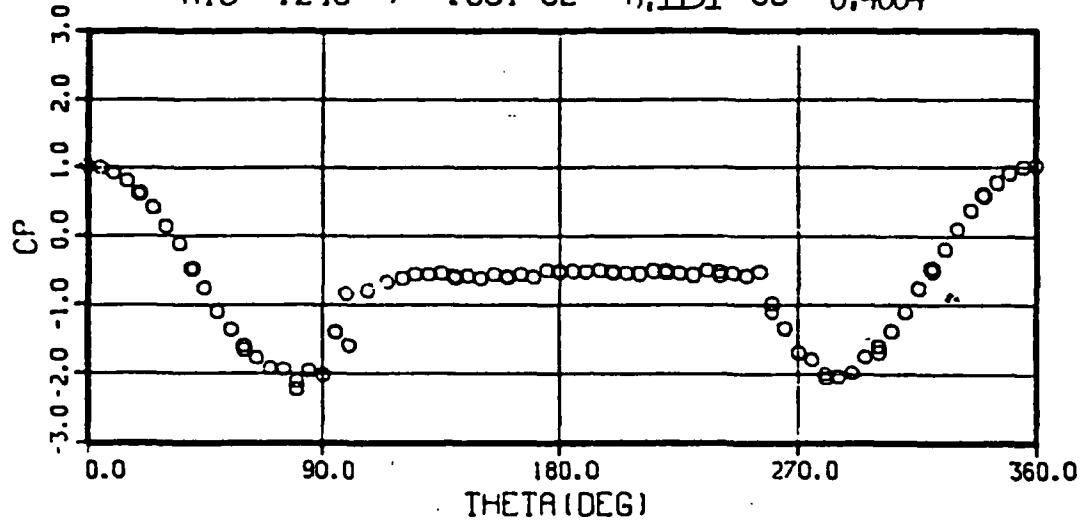
RUN 006 OIU-343.7 +/- 7.70 RNDIU-6.798 +/- .082  
PIU- 8775. +/- 38.20 VIU-270.50 +/- 2.860  
MIU- .236 +/- .003 CL- -0.0606 CD- 0.4666



CP VALUES ALONG LONGITUDINAL RAYS AT  
POLAR ANGLE OF 40DEG-0 64DEG-+ 124DEG-X.  
THE 5 SETS OF POINTS AT EACH LOCATION  
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

SMOOTH CYLINDER

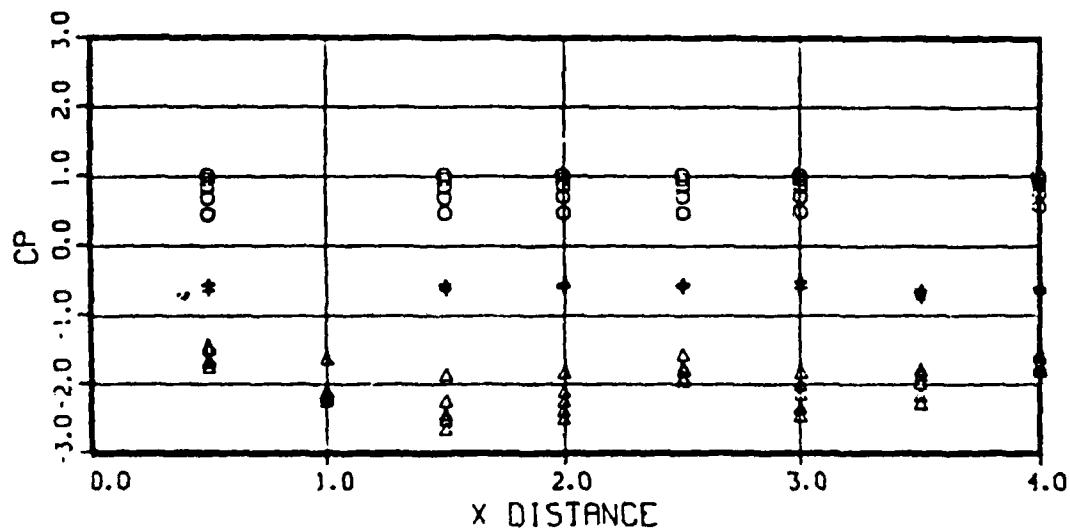
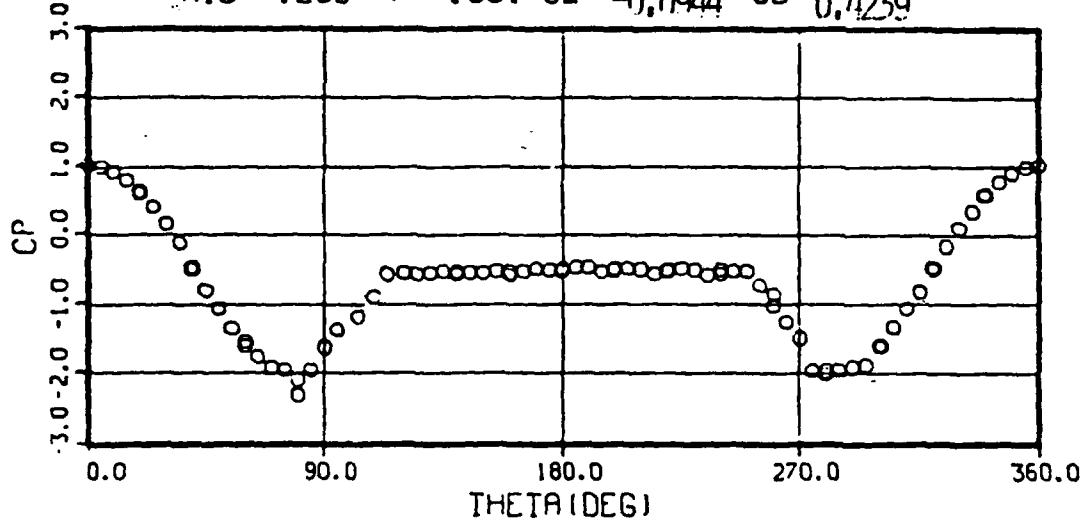
RUN 007 OIU-305.1 +/- 3.36 RNDIU-5.907 +/- .034  
PIU- 7549. +/- 17.00 VIU-275.39 +/- 2.566  
MIU- .240 +/- .001 CL- -0.1131 CD- 0.4604



CP VALUES ALONG LONGITUDINAL RAYS AT  
POLAR ANGLE OF 40DEG-0 64DEG-+ 124DEG-X.  
THE 5 SETS OF POINTS AT EACH LOCATION  
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

SMOOTH CYLINDER

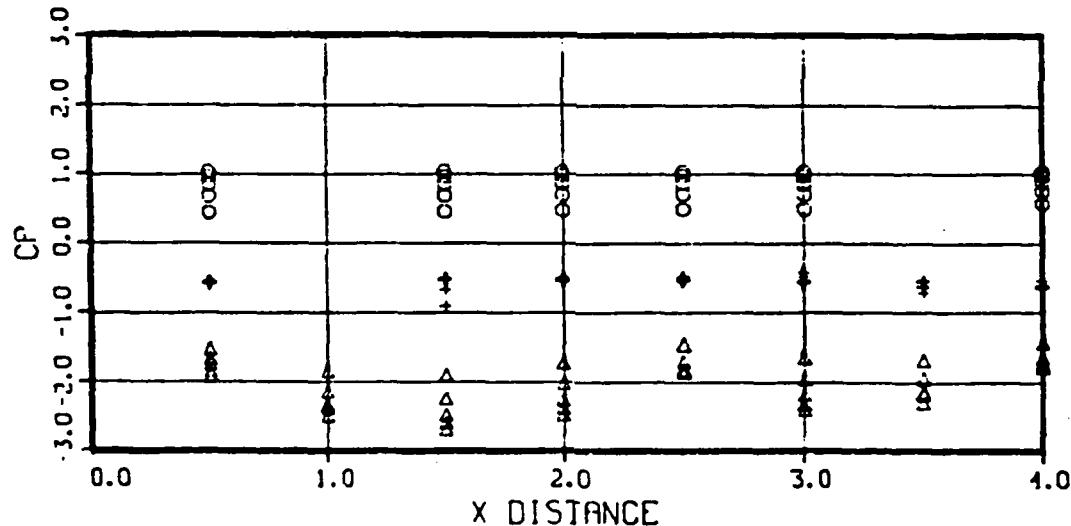
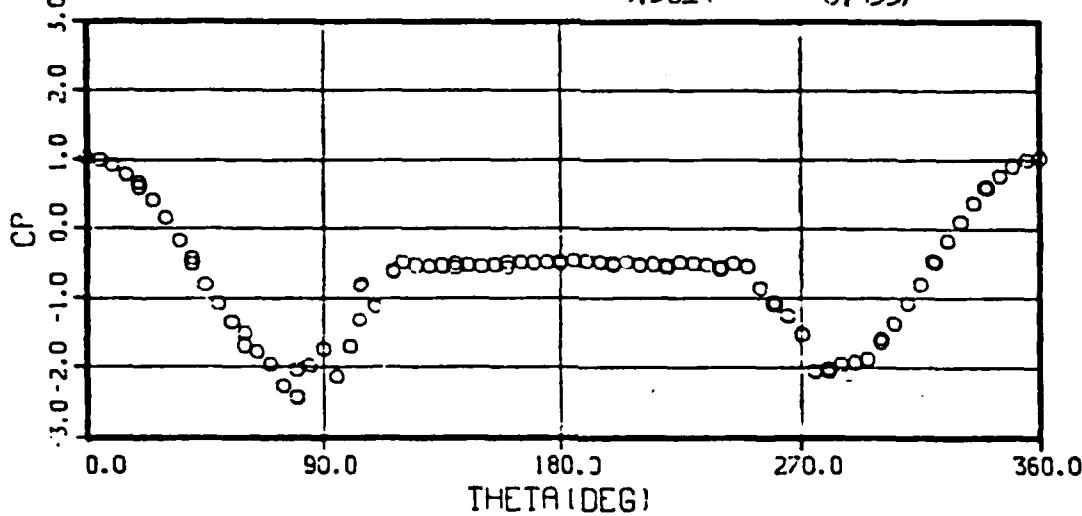
RUN 008 OIU-254.0 +/- 2.24 RIU-4.929 +/- .023  
PIU- 6331. +/- 1.80 VIU-274.53 +/- 1.190  
MIU- .239 +/- .001 CL- -0.1044 CD- 0.14239



CP VALUES ALONG LONGITUDINAL RAYS AT  
POLAR ANGLE OF 4DEG-0 64DEG-+ 124DEG-X.  
THE 5 SETS OF POINTS AT EACH LOCATION  
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

SMOOTH CYLINDER

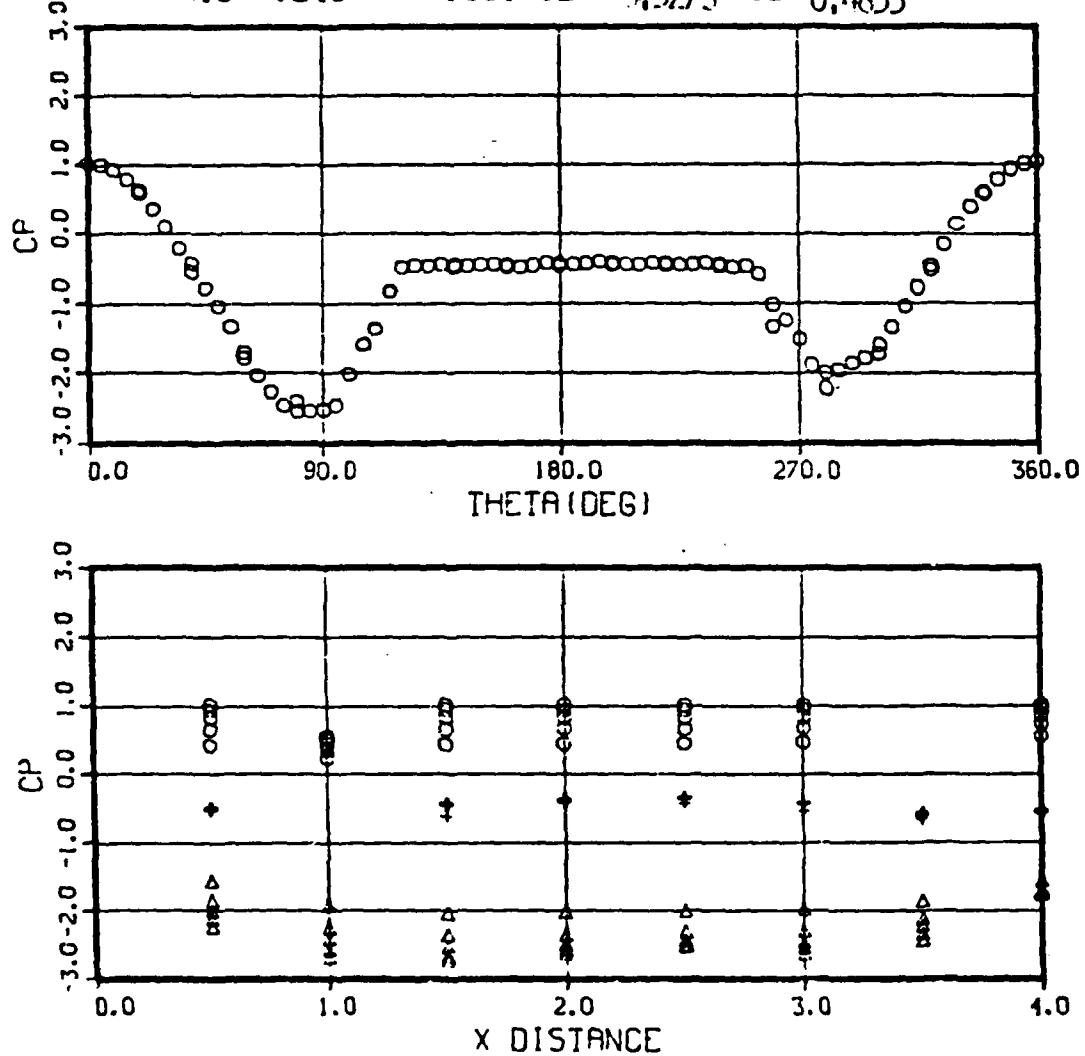
RUN 009 CIU-200.8 +/- 1.26 RNDIU-3.934 +/- .030  
PIU- 5020. +/- 31.60 VIU-273.23 +/- .896  
MIU- .239 +/- .001 CL- -0.3914 CD- 0.4357



CP VALUES ALONG LONGITUDINAL RAYS AT  
POLAR ANGLE OF 40<sup>0</sup>-0 64<sup>0</sup>-+ 124<sup>0</sup>-x.  
THE 5 SETS OF POINTS AT EACH LOCATION  
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

SMOOTH CYLINDER

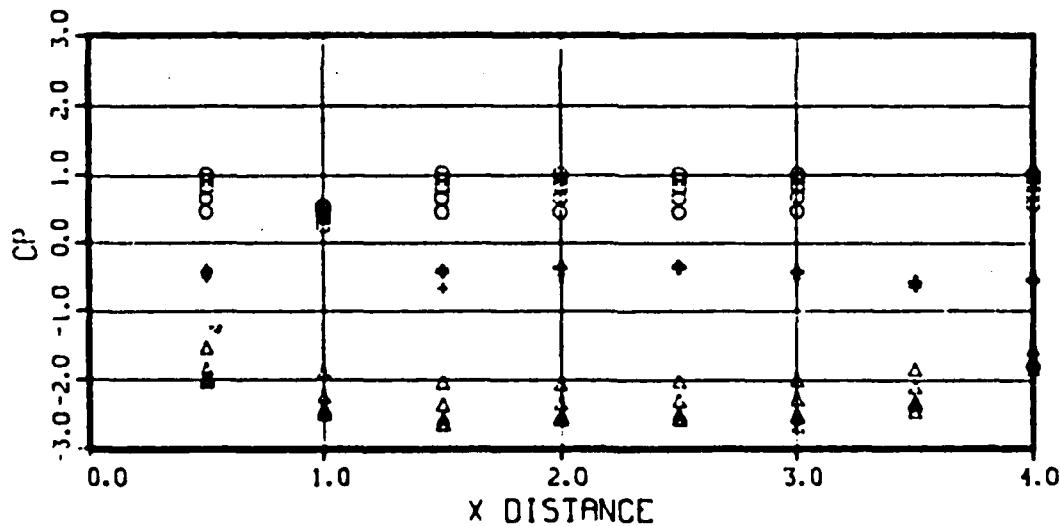
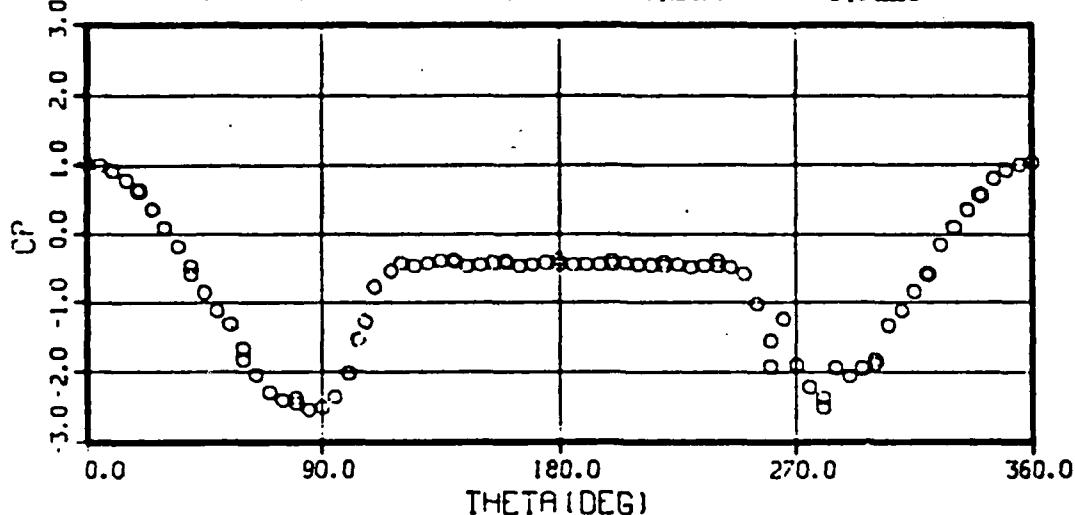
RUN 012 01U-151.2 +/- .70 RND1U-2.987 +/- .030  
PIU- 3737. +/- 10.60 VIU-273.30 +/- .784  
MIU- .240 +/- .001 CL- -0.3279 CD- 0.1855



CP VALUES ALONG LONGITUDINAL RAYS AT  
POLAR ANGLE OF 4DEG-0 64DEG-+ 124DEG-X.  
THE 5 SETS OF POINTS AT EACH LOCATION  
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

SMOOTH CYLINDER

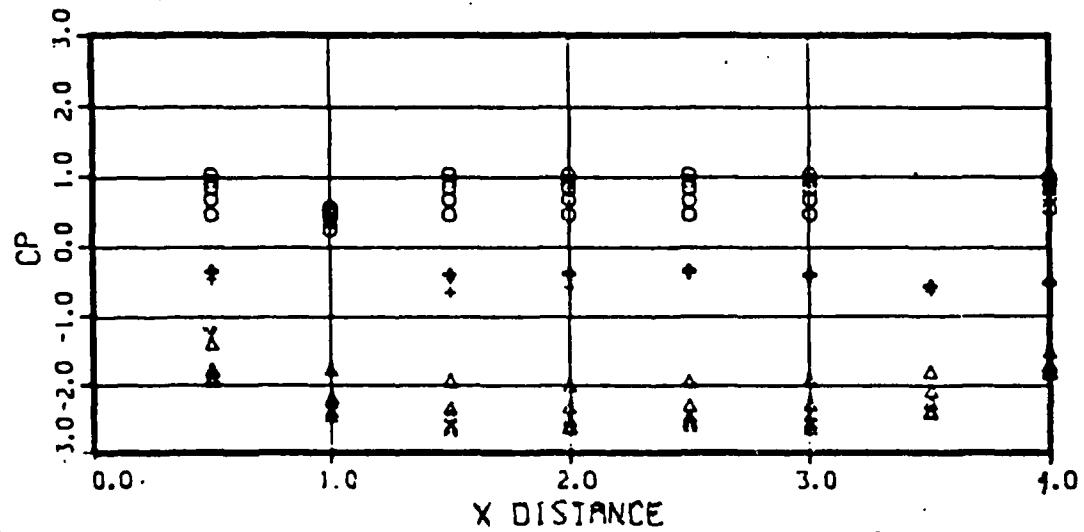
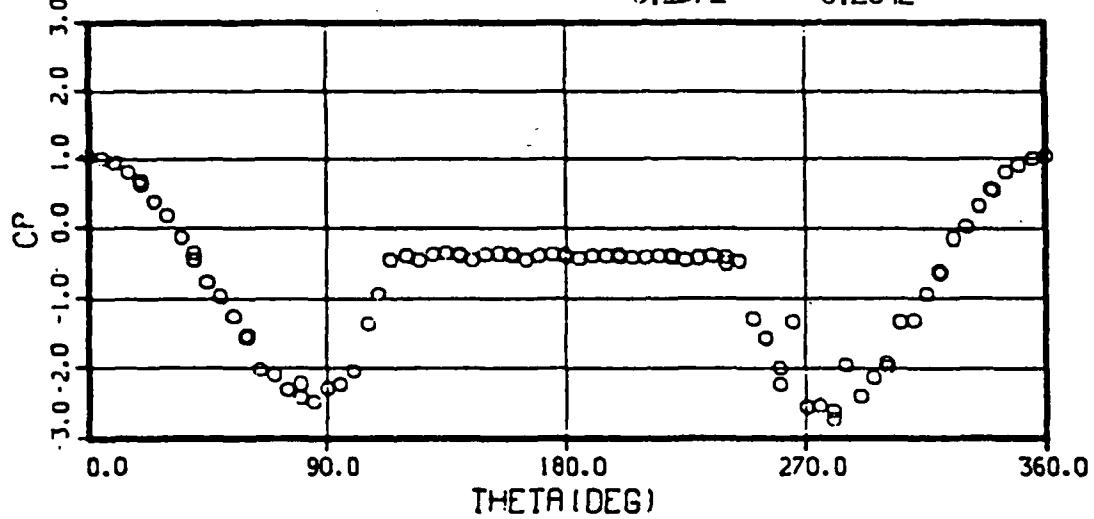
RUN 013 01U-127.7 +/- .84 RND1U-2.523 +/- .008  
PIU- 3170. +/- 6.00 VIU-272.80 +/- 1.044  
MIU- .240 +/- .001 CL- -0.2873 CD- 0.3228



CP VALUES ALONG LONGITUDINAL RAYS AT  
POLAR ANGLE OF 4DEG-0 64DEG-+ 124DEG-X.  
THE 5 SETS OF POINTS AT EACH LOCATION  
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

SMOOTH CYLINDER

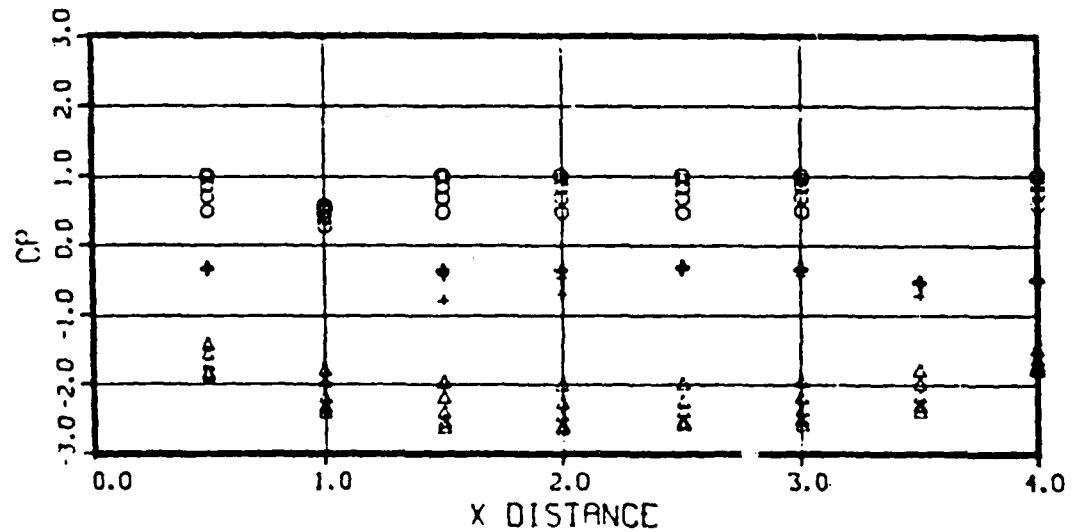
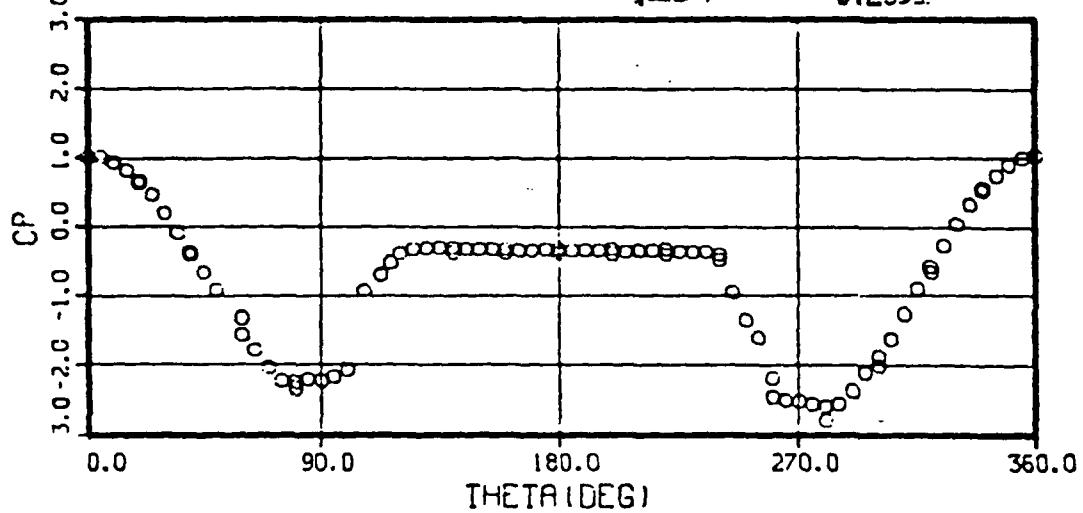
RUN 014 OIU-100.9 +/- .56 RNDIU-1.991 +/- .018  
PIU- 2485. +/- 6.60 VIU-273.79 +/- .260  
MIU- .241 +/- .001 CL- -0.1372 CD- 0.2842



CP VALUES ALONG LONGITUDINAL RAYS AT  
POLAR ANGLE OF 4DEG-0 64DEG-+ 124DEG-X.  
THE 5 SETS OF POINTS AT EACH LOCATION  
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

SMOOTH CYLINDER

RUN 015 O1U- 77.0 +/- 1.12 RND1U-1.510 +/- .010  
PIU- 1872. +/- 1.80 VIU-275.60 +/- 2.016  
MIU- .243 +/- .002 CL- 0.2234 CD- 0.2951



CP VALUES ALONG LONGITUDINAL RAYS AT  
POLAR ANGLE OF 40DEG-0 64DEG-+ 124DEG-X.  
THE 5 SETS OF POINTS AT EACH LOCATION  
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

AD-A168 351

ANALYSIS OF FLUID FLOW AT VERY HIGH REYNOLDS NUMBER  
AROUND SMOOTH & ROUGH. (U) ALABAMA A AND M UNIV NORMAL  
DEPT OF PHYSICS S S MURTY ET AL. JUL 83

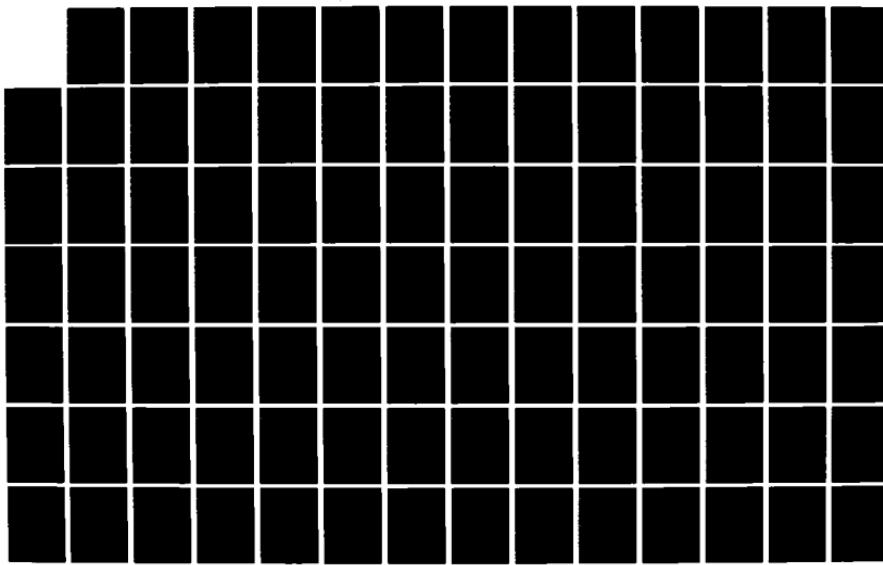
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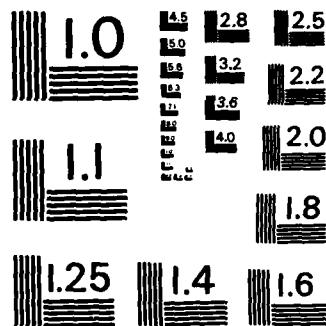
UNCLASSIFIED

N00014-83-K-0351

F/G 28/4

NL

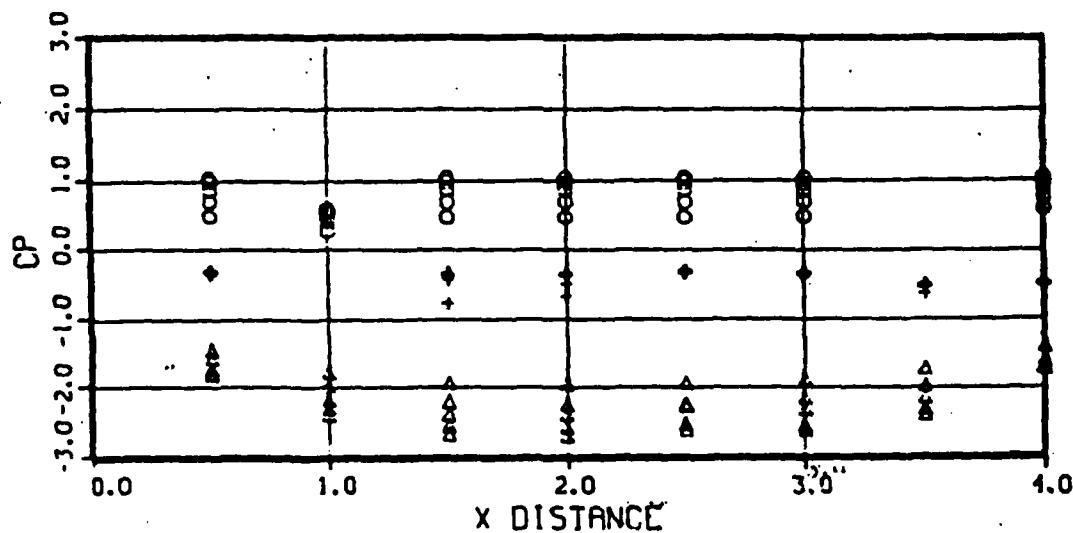
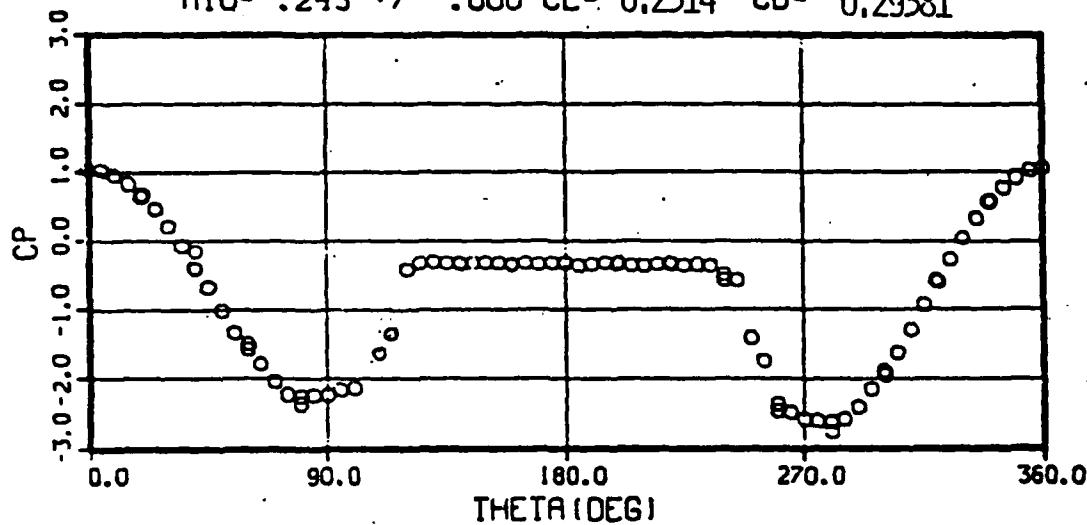




MICROCOPY RESOLUTION TEST CHART  
NATIONAL BUREAU OF STANDARDS - 1963 - A

SMOOTH CYLINDER

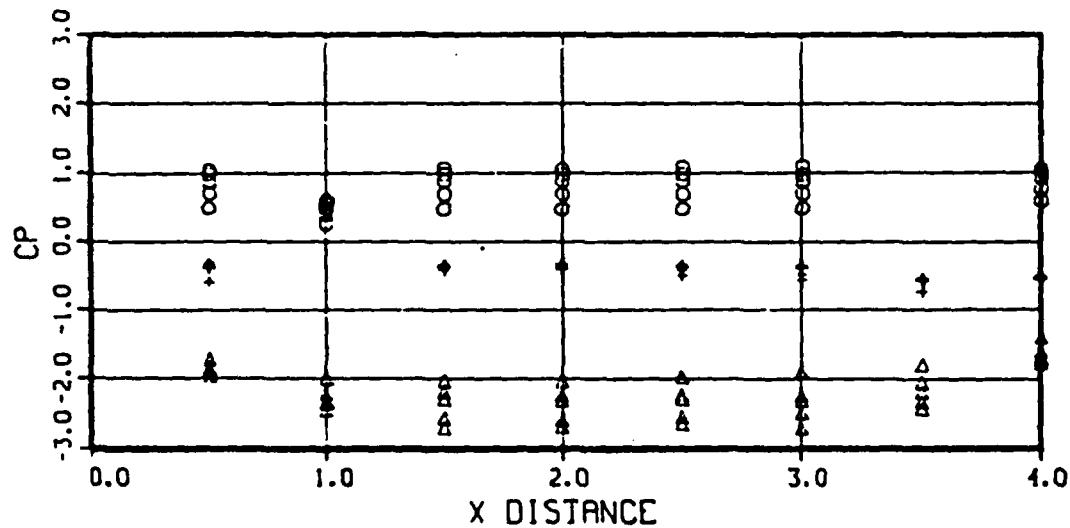
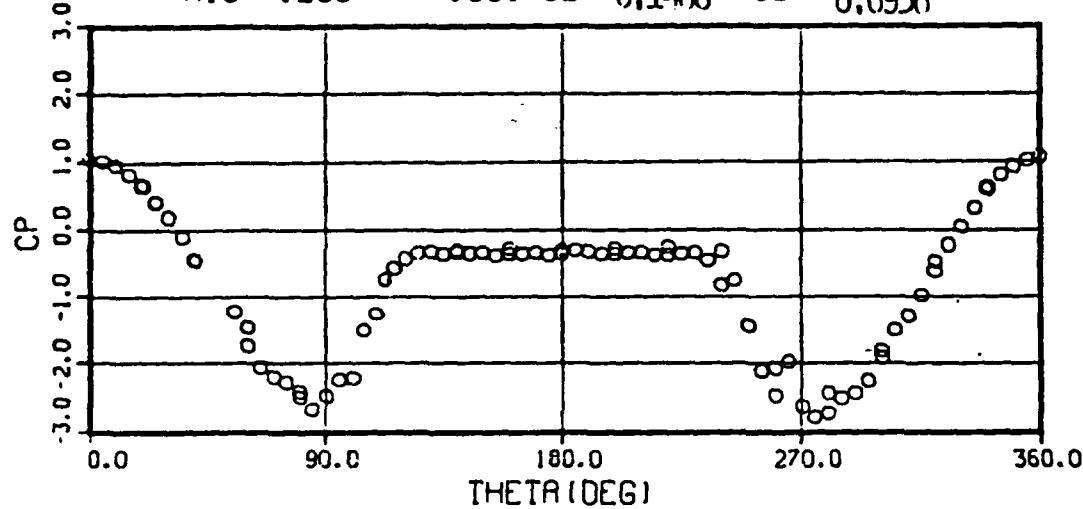
RUN 016 O1U- 64.6 +/- .00 RND1U-1.266 +/- .001  
PIU- 1566. +/- 3.20 VIU-275.61 +/- .098  
M1U- .243 +/- .000 CL- 0.2314 CD- 0.29381



CP VALUES ALONG LONGITUDINAL RAYS AT  
POLAR ANGLE OF 4DEG-0 64DEG-+ 124DEG-X.  
THE 5 SETS OF POINTS AT EACH LOCATION  
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

SMOOTH CYLINDER

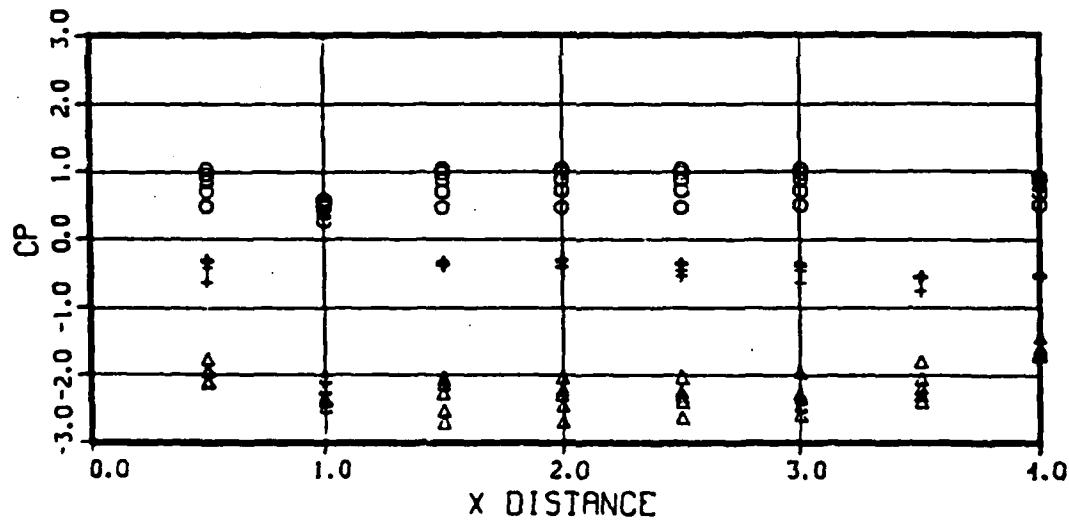
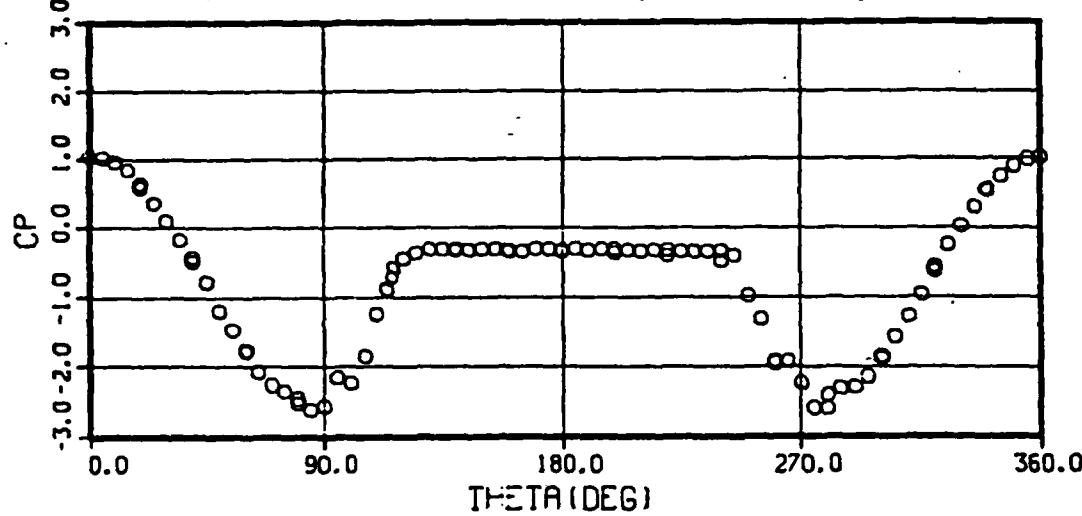
RUN 017 OIU- 50.4 +/- .00 RND1U-1.004 +/- .001  
PIU- 1255. +/- 9.20 VIU-271.75 +/- .446  
MIU- .239 +/- .001 CL- 0.1408 CD- 0.6936



CP VALUES ALONG LONGITUDINAL RAYS AT  
POLAR ANGLE OF 4DEG-0 64DEG--+ 124DEG-X.  
THE 5 SETS OF POINTS AT EACH LOCATION  
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

SMOOTH CYLINDER

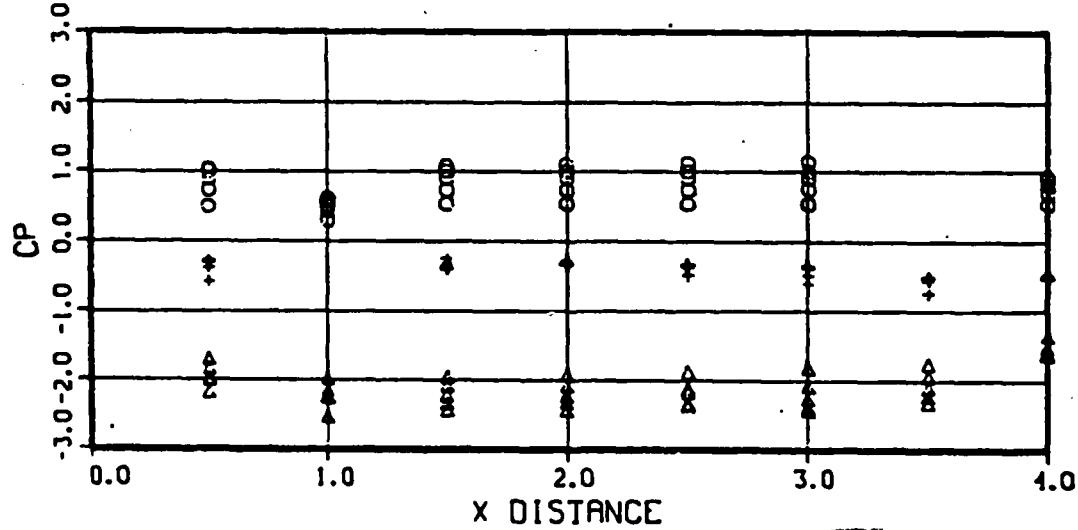
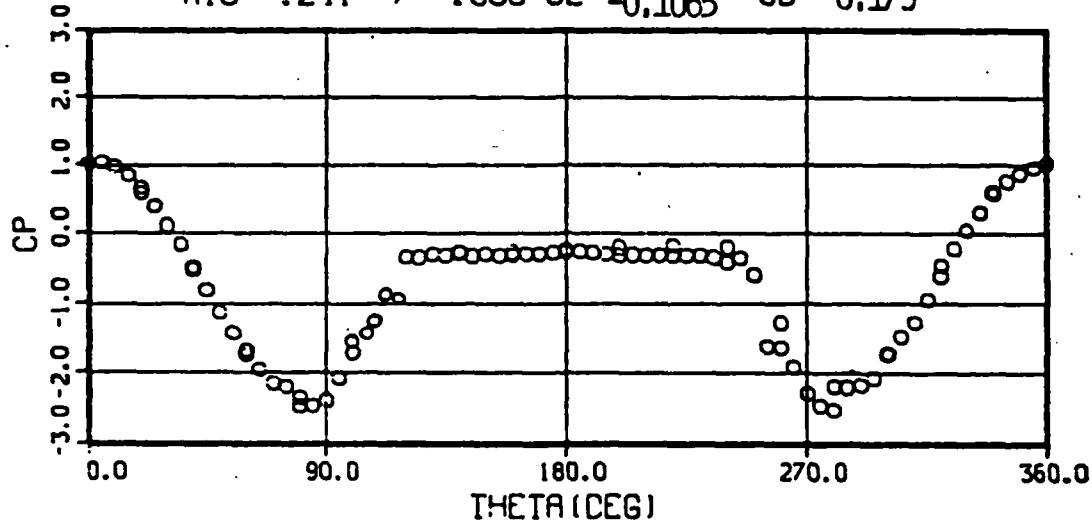
RUN 018 01U- 44.7 +/- .00 RND1U- .891 +/- .000  
P1U- 1115. +/- 2.20 VIU-271.61 +/- .192  
MIU- .239 +/- .000 CL- 0.0554 CD- 0.6448



CP VALUES ALONG LONGITUDINAL RAYS AT  
POLAR ANGLE OF 4DEG-0 64DEG-+ 124DEG-X.  
THE 5 SETS OF POINTS AT EACH LOCATION  
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

SMOOTH CYLINDER

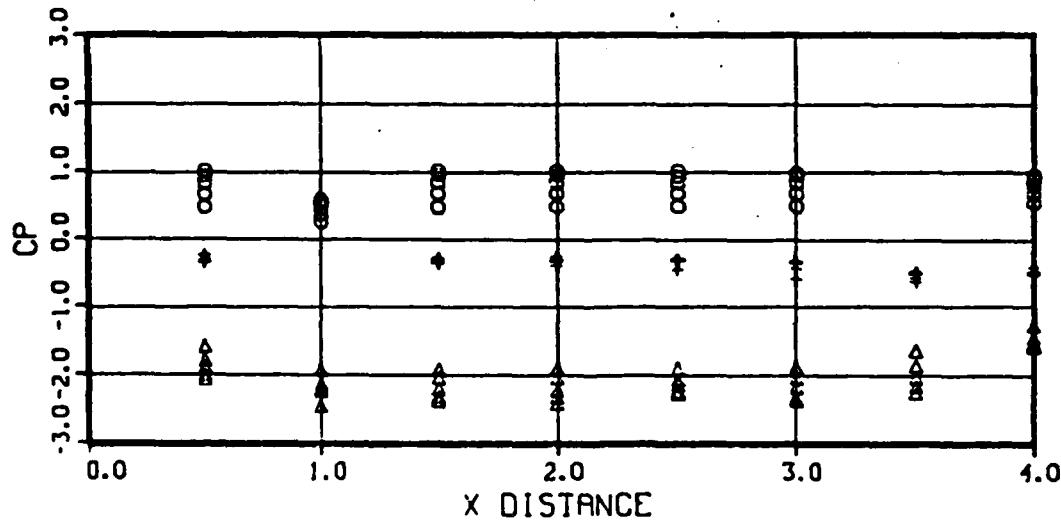
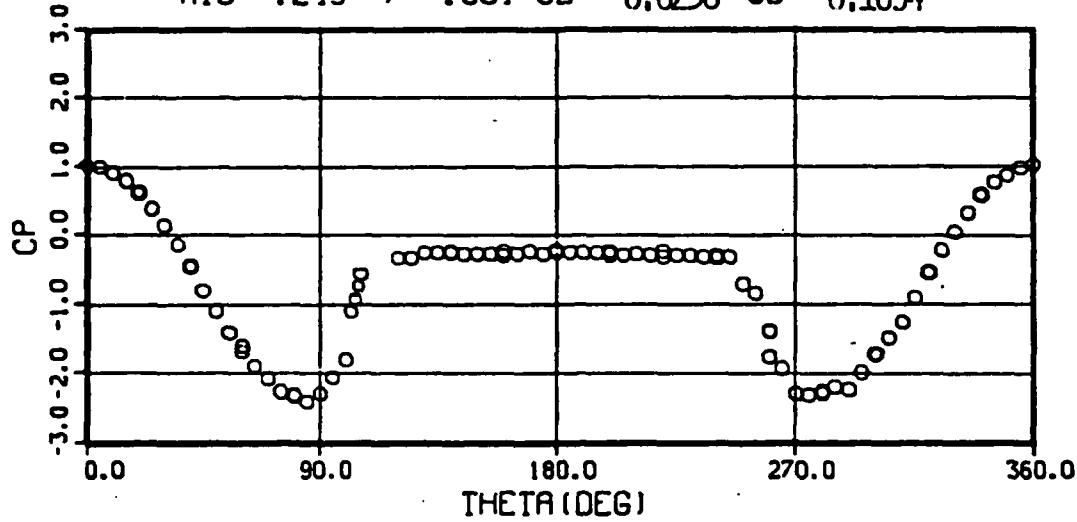
RUN 019 01U- 40.7 +/- .20 RNDIU- .807 +/- .003  
PIU- 1000. +/- 3.00 VIU-273.44 +/- .620  
MIU- .241 +/- .000 CL- -0.1065 CD- 0.179



CP VALUES ALONG LONGITUDINAL RAYS AT  
POLAR ANGLE OF 4DEG-0 64DEG-+ 124DEG-X.  
THE 5 SETS OF POINTS AT EACH LOCATION  
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

SMOOTH CYLINDER

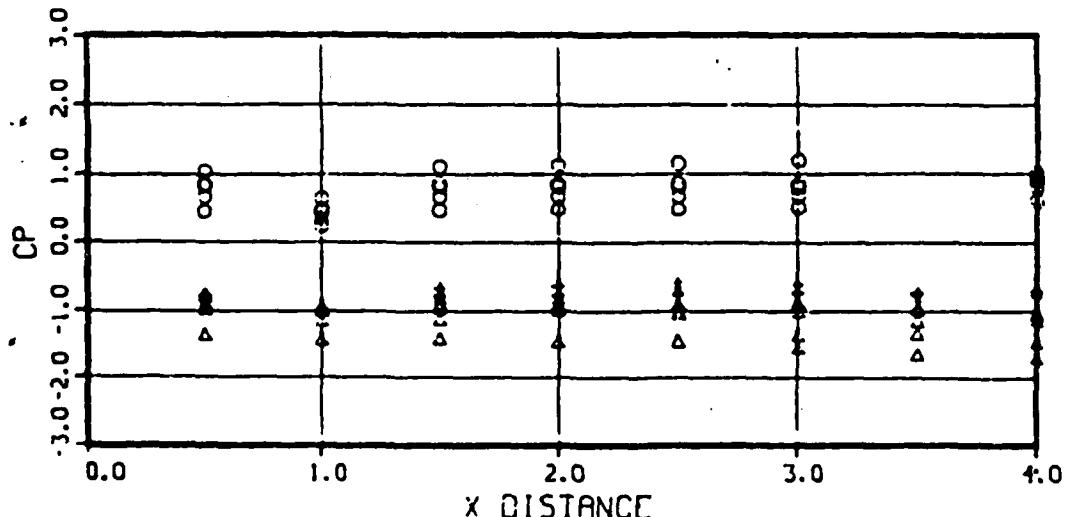
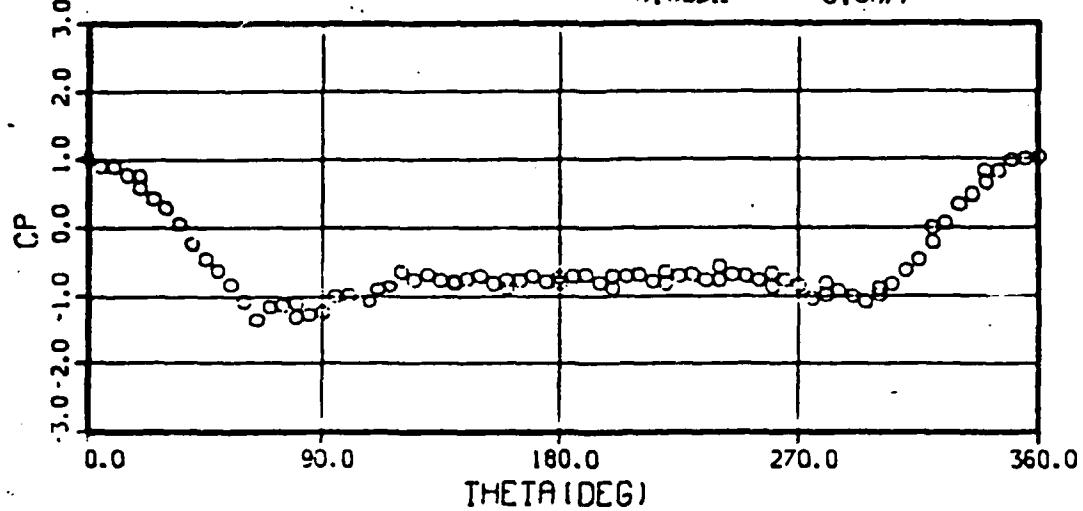
RUN 020 QIU- 35.3 +/- .06 RNDIU- .695 +/- .001  
PIU- 855. +/- 4.00 VIU-274.96 +/- .586  
MIU- .243 +/- .001 CL- -0.0238 CD- 0.1694



CP VALUES ALONG LONGITUDINAL RAYS AT  
POLAR ANGLE OF 4DEG-O 64DEG--+ 124DEG-X.  
THE 5 SETS OF POINTS AT EACH LOCATION  
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

SMOOTH CYLINDER

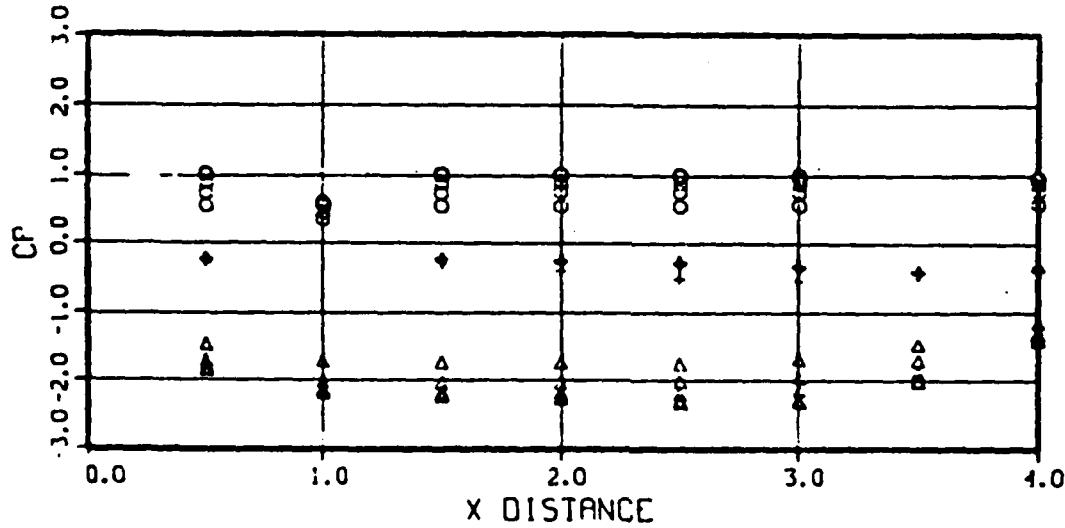
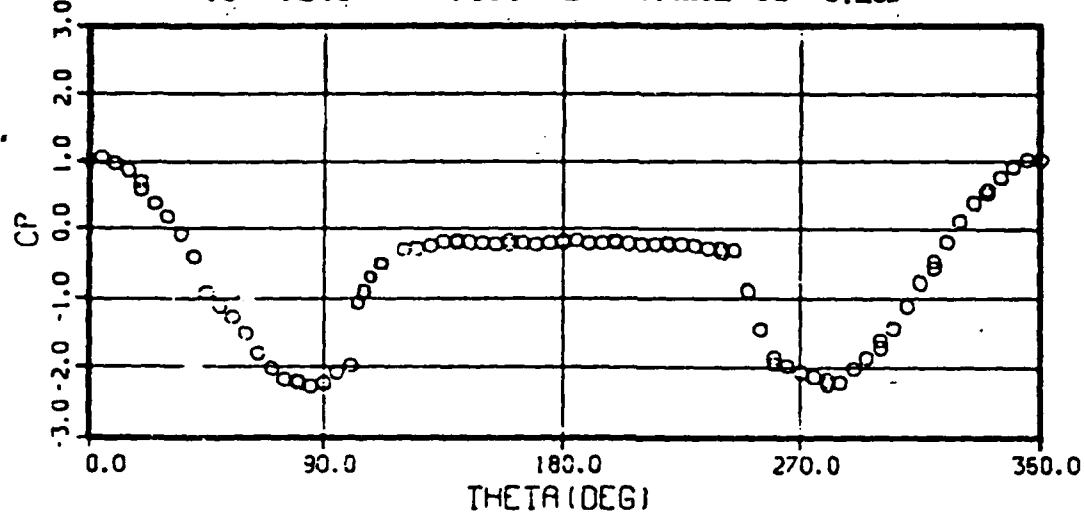
RUN 021 O1U- 20.7 +/- .46 RND1U- .407 +/- .005  
PIU- 495. +/- 6.20 VIU-275.97 +/- 1.664  
MIU- .244 +/- .001 CL- -0.0932 CD- 0.8077



CP VALUES ALONG LONGITUDINAL RAYS AT  
POLAR ANGLE OF 40DEG-0 64DEG-+ 124DEG-X.  
THE 5 SETS OF POINTS AT EACH LOCATION  
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

SMOOTH CYLINDER

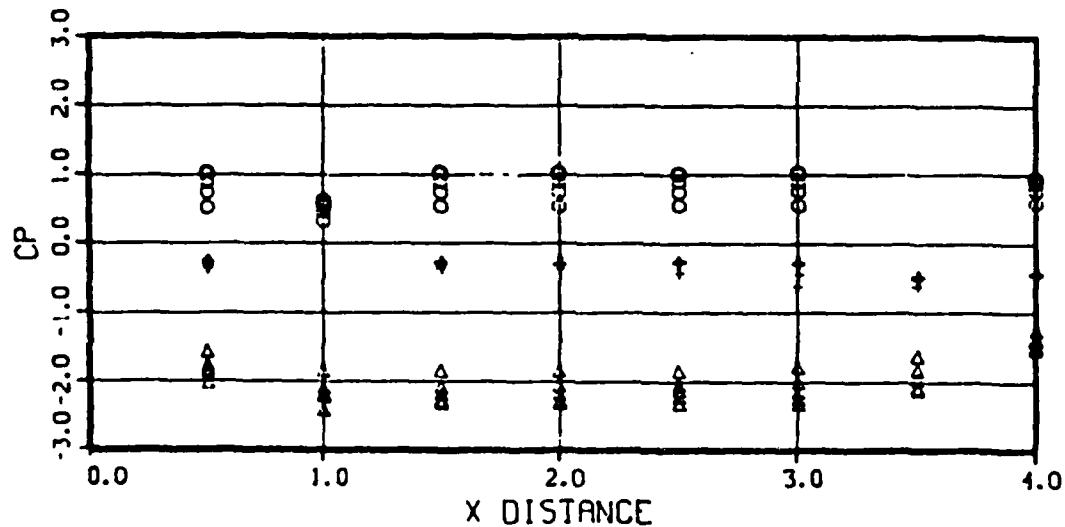
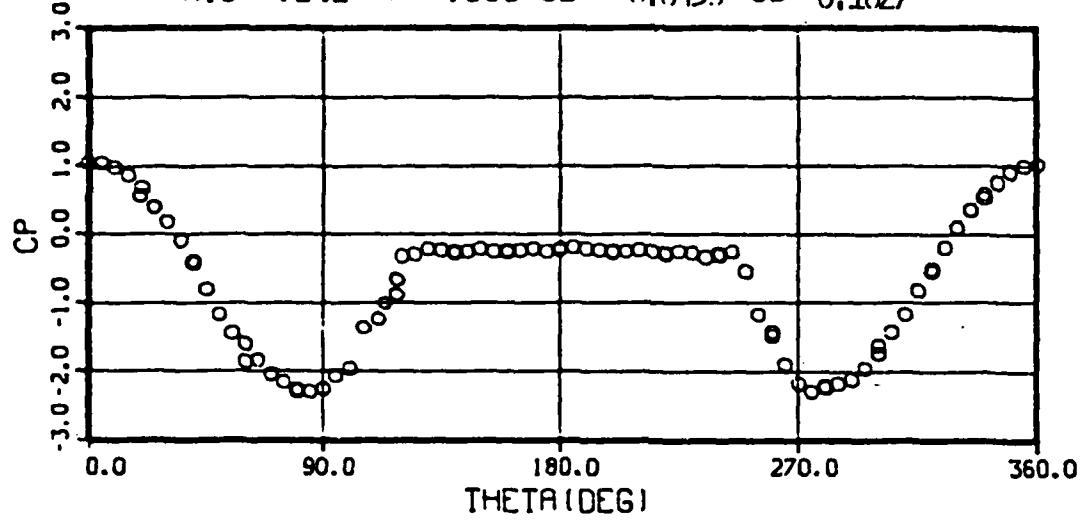
RUN 022 QIU- 25.8 +/- .00 RNDIU- .507 +/- .003  
PIU- 621. +/- 2.20 VIU-275.84 +/- .652  
MIU- .243 +/- .001 CL- -0.0261 CD- 0.183



CP VALUES ALONG LONGITUDINAL RAYS AT  
POLAR ANGLE OF 4DEG-0 64DEG-+ 124DEG-X.  
THE 5 SETS OF POINTS AT EACH LOCATION  
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

SMOOTH CYLINDER

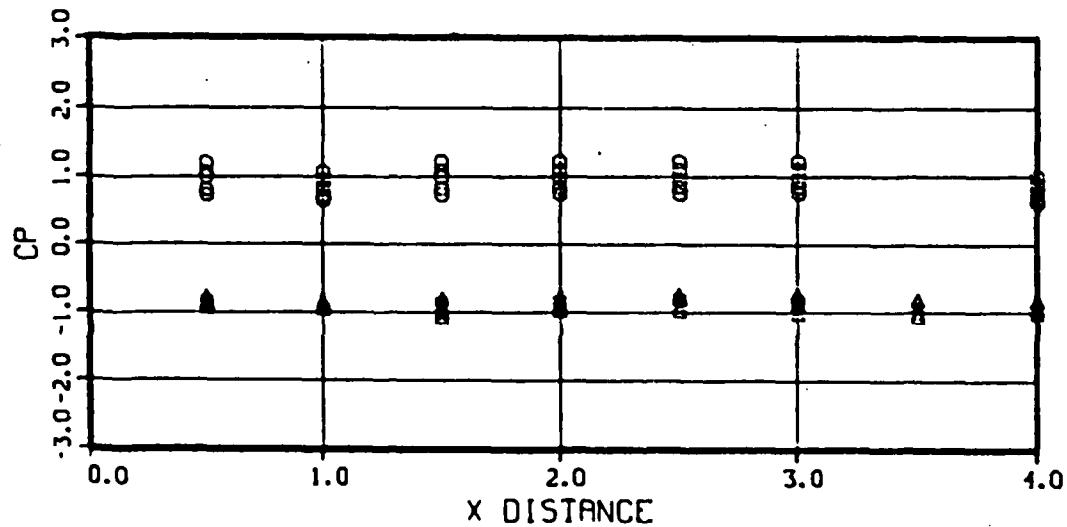
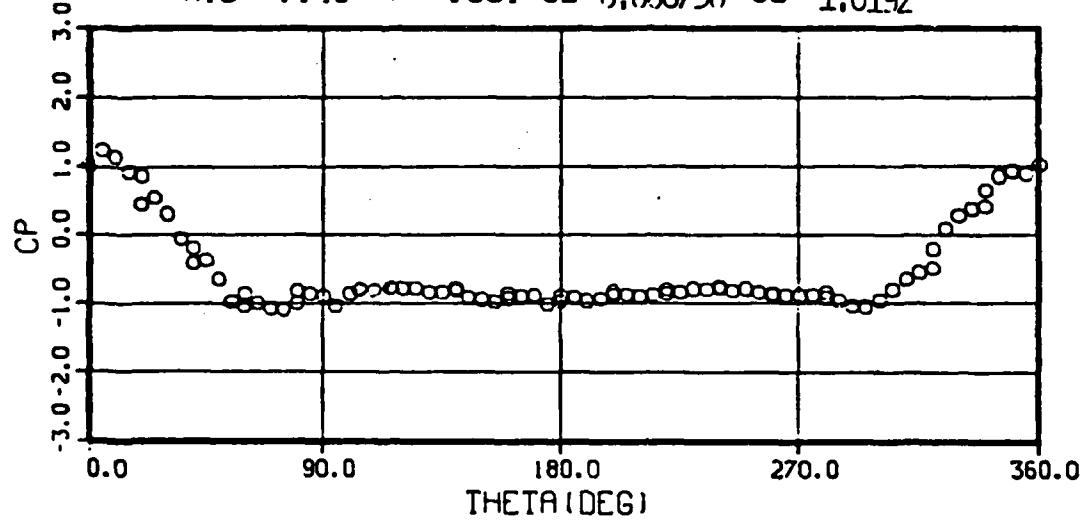
RUN 023 CIU- 30.7 +/- .00 RNDIU- .605 +/- .003  
PIU- 748. +/- 1.60 VIU-274.45 +/- .358  
MIU- .242 +/- .000 CL- -0.0439 CD- 0.1627



CP VALUES ALONG LONGITUDINAL RAYS AT  
POLAR ANGLE OF 40DEG-0 64DEG-+ 121DEG-X.  
THE 5 SETS OF POINTS AT EACH LOCATION  
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

SMOOTH CYLINDER

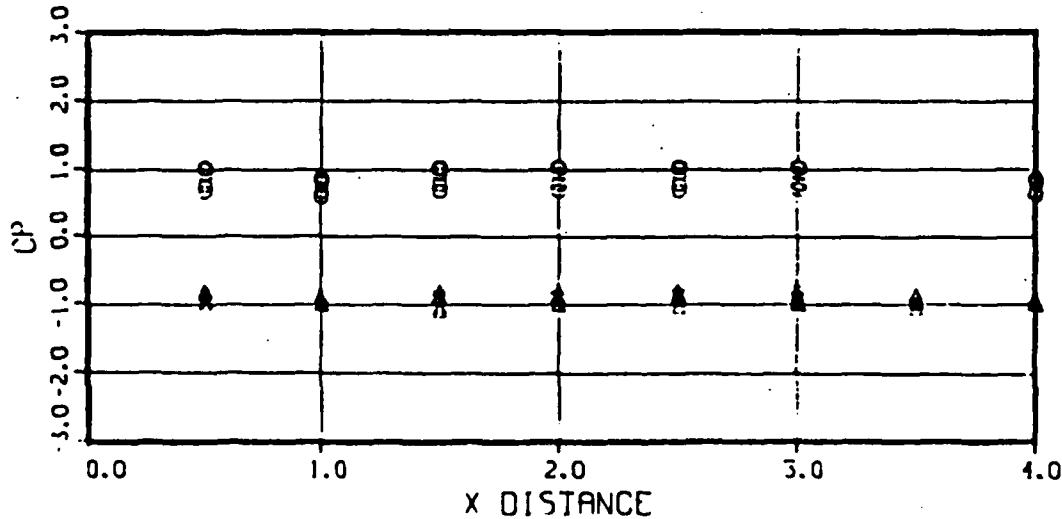
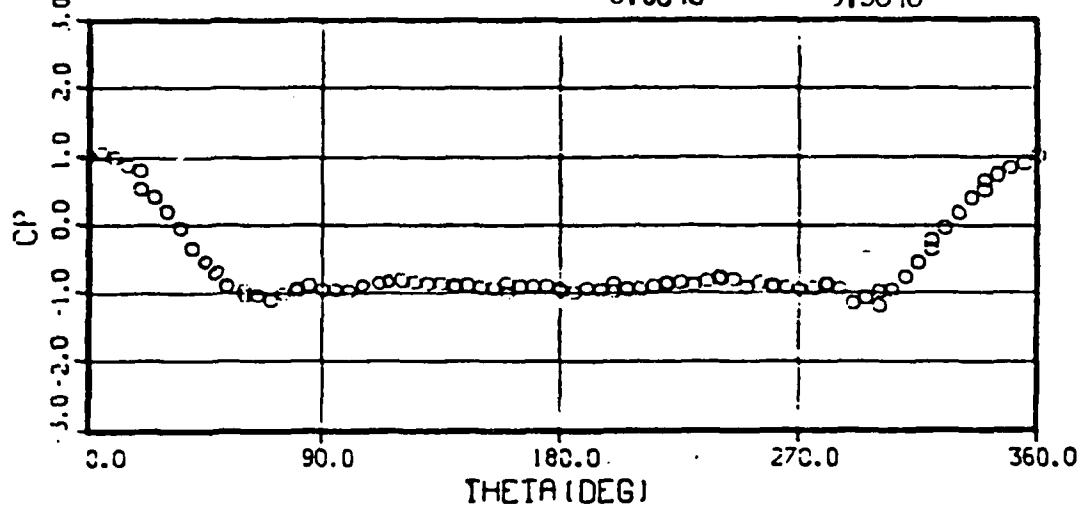
RUN 033 OIU- 9.0 +/- .00 RNDIU- .304 +/- .002  
PIU- 614. +/- 2.40 VIU- 162.43 +/- .350  
MIU- .145 +/- .001 CL-0.008750 CD- 1.0192



CP VALUES ALONG LONGITUDINAL RAYS AT  
POLAR ANGLE OF 4DEG-0 64DEG-+ 121DEG-X.  
THE 5 SETS OF POINTS AT EACH LOCATION  
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

SMOOTH CYLINDER

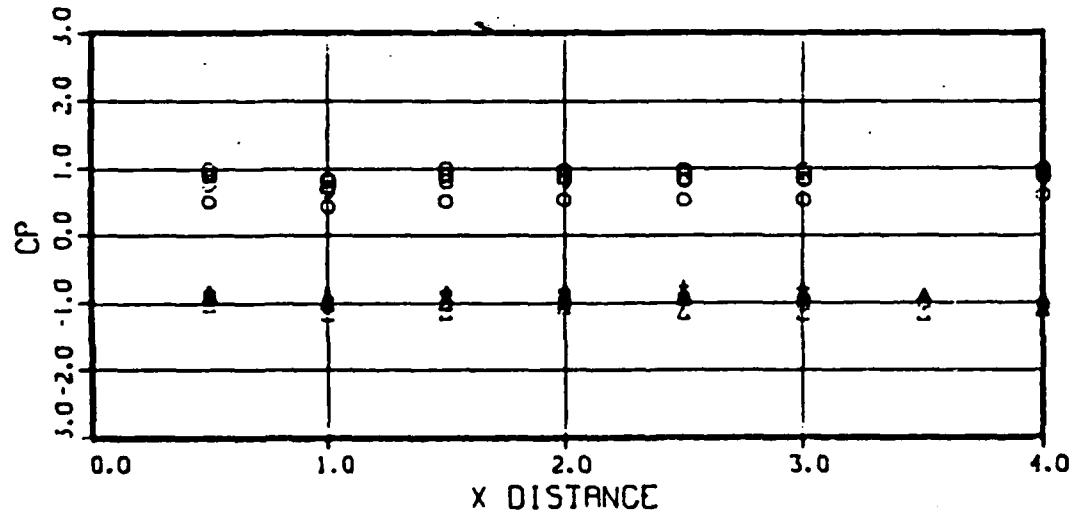
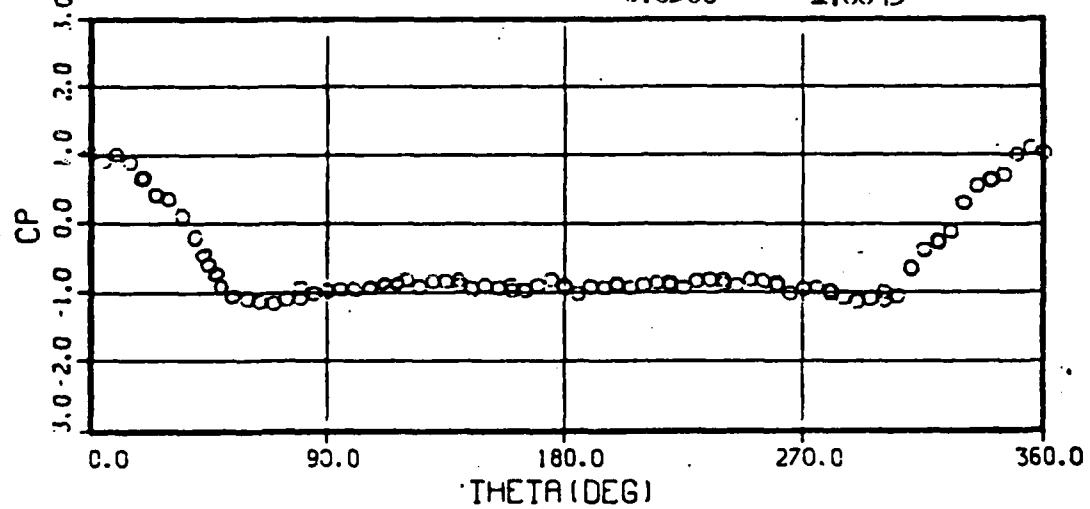
RUN 034 O1U- 9.1 +/- .12 RNDIU- .309 +/- .003  
P1U- 623. +/- 4.80 V1U-162.53 +/- .260  
M1U- .145 +/- .001 CL- 0.0046 CD- 0.9846



CP VALUES ALONG LONGITUDINAL RAYS AT  
POLAR ANGLE OF 4DEG-0 64DEG-+ 124DEG-X.  
THE 5 SETS OF POINTS AT EACH LOCATION  
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

SMOOTH CYLINDER

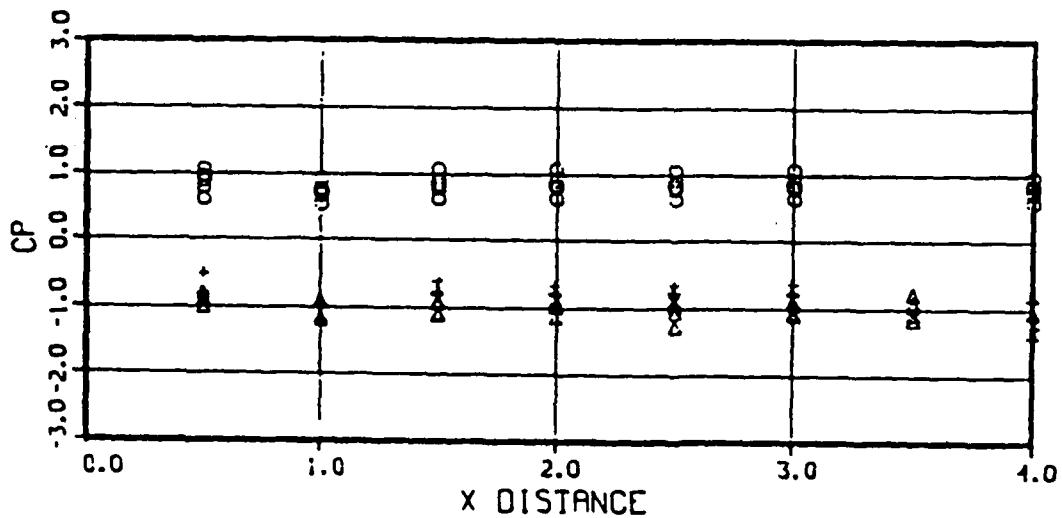
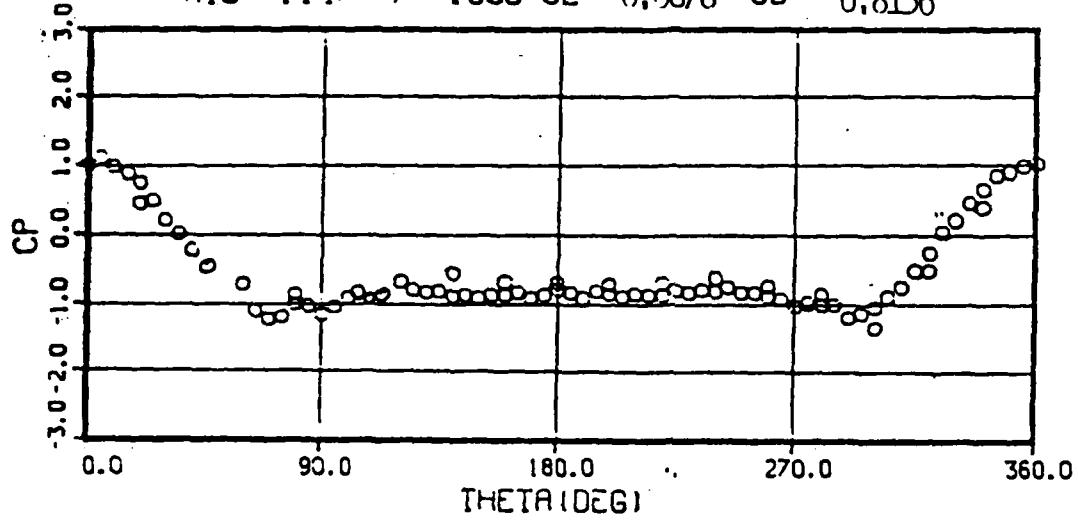
RUN 035 CIU- 9.8 +/- .12 RNDIU- .325 +/- .003  
PIU- 648. +/- 5.80 VIU- 164.90 +/- .334  
MIU- .147 +/- .001 CL- -0.0306 CD- 1.0045



CP VALUES ALONG LONGITUDINAL RAYS AT  
POLAR ANGLE OF 40DEG-0 64DEG-- 124DEG-X.  
THE 5 SETS OF POINTS AT EACH LOCATION  
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

SMOOTH CYLINDER

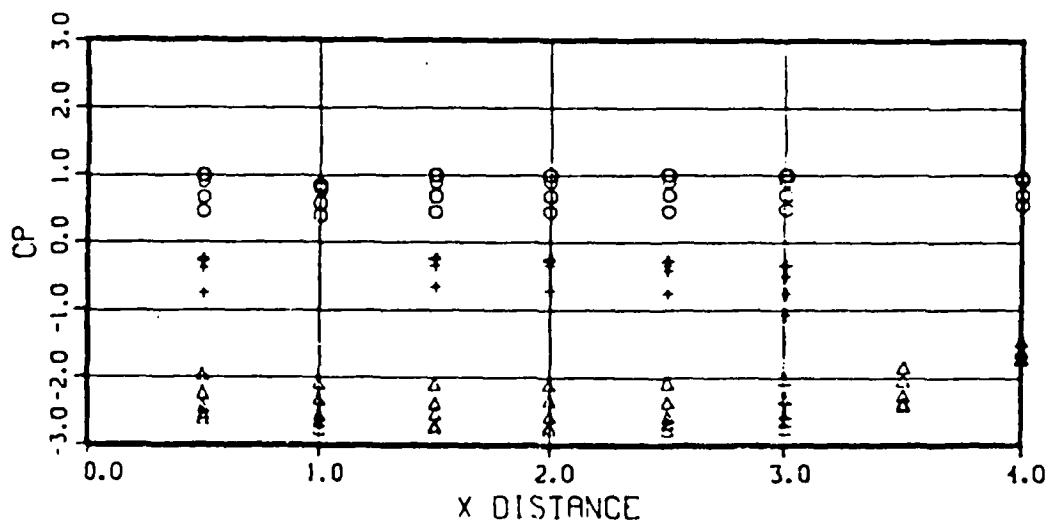
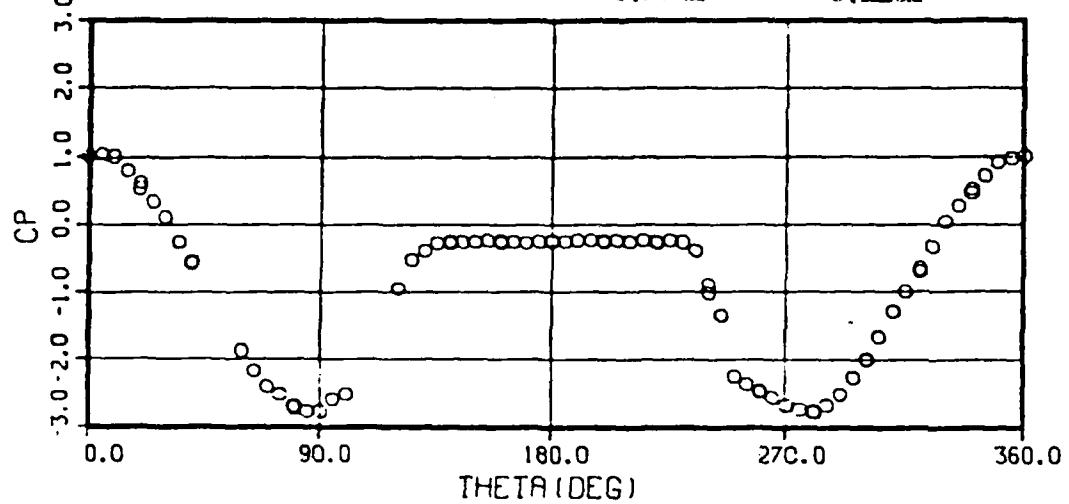
RUN 036 OIU- 10.6 +/- .06 RNDIU- .354 +/- .002  
PIU- 704. +/- 2.60 VIU-155.28 +/- .234  
MIU- .147 +/- .000 CL- 0.0878 CD- 0.8156



CP VALUES ALONG LONGITUDINAL RAYS AT  
POLAR ANGLE OF 4DEG-0 64DEG-+ 124DEG-X.  
THE 5 SETS OF POINTS AT EACH LOCATION  
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

SMOOTH CYLINDER

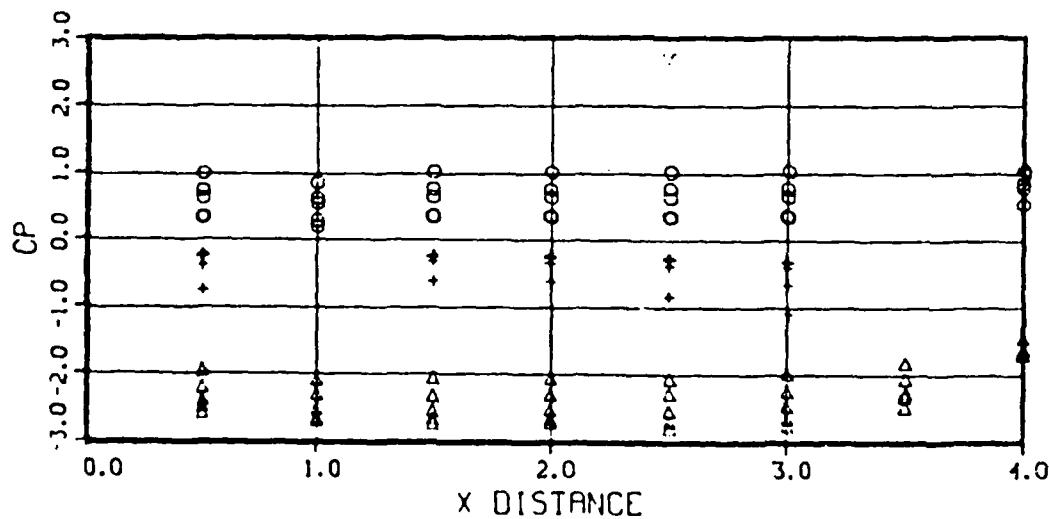
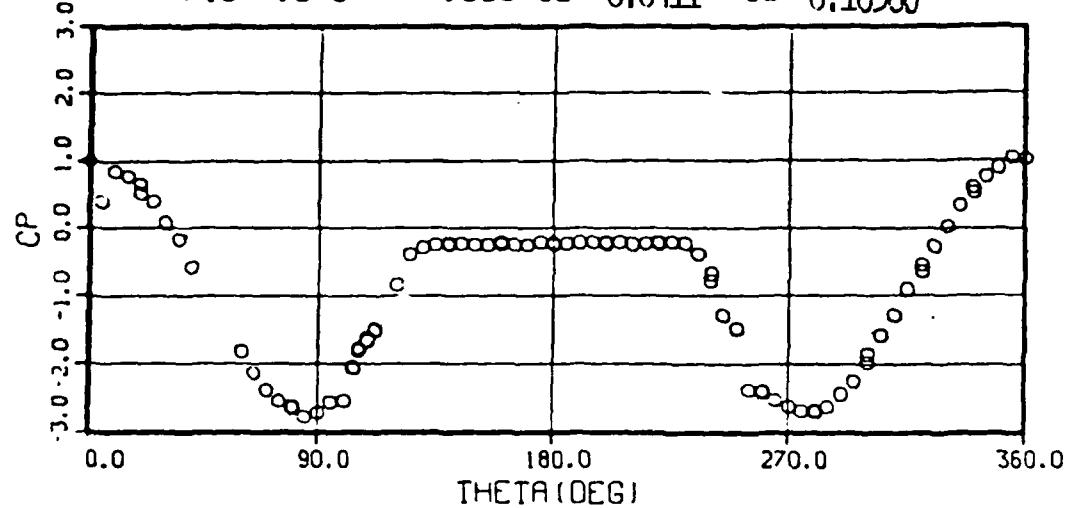
RUN 053 OIU- 6.5 +/- .00 RNDIU- .459 +/- .000  
PIU- 2094. +/- .00 VIU- 75.29 +/- .008  
MIU- .067 +/- .000 CL- 0.7642 CD- 0.2182



CP VALUES ALONG LONGITUDINAL RAYS AT  
POLAR ANGLE OF 40DEG-0 64DEG--+ 124DEG-X.  
THE 5 SETS OF POINTS AT EACH LOCATION  
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

SMOOTH CYLINDER

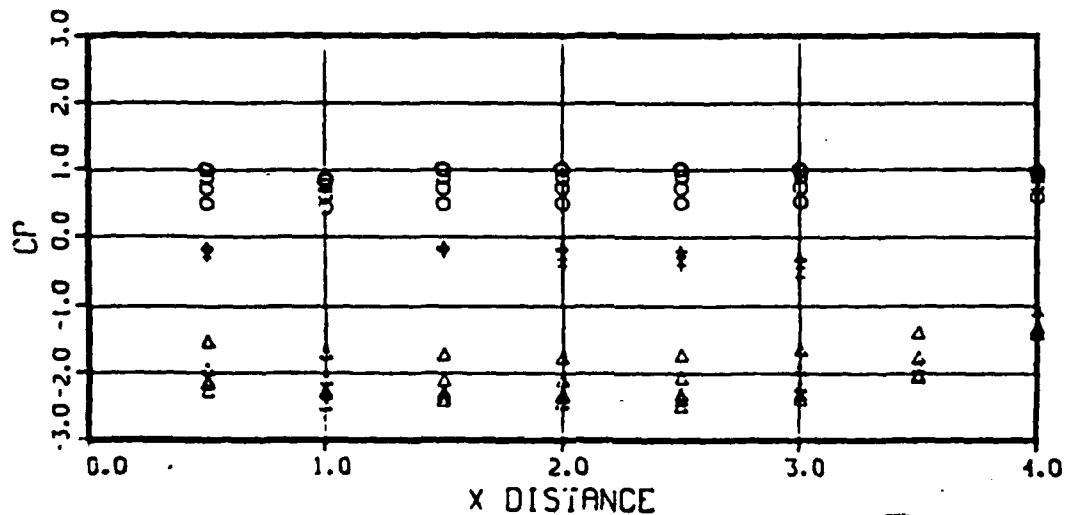
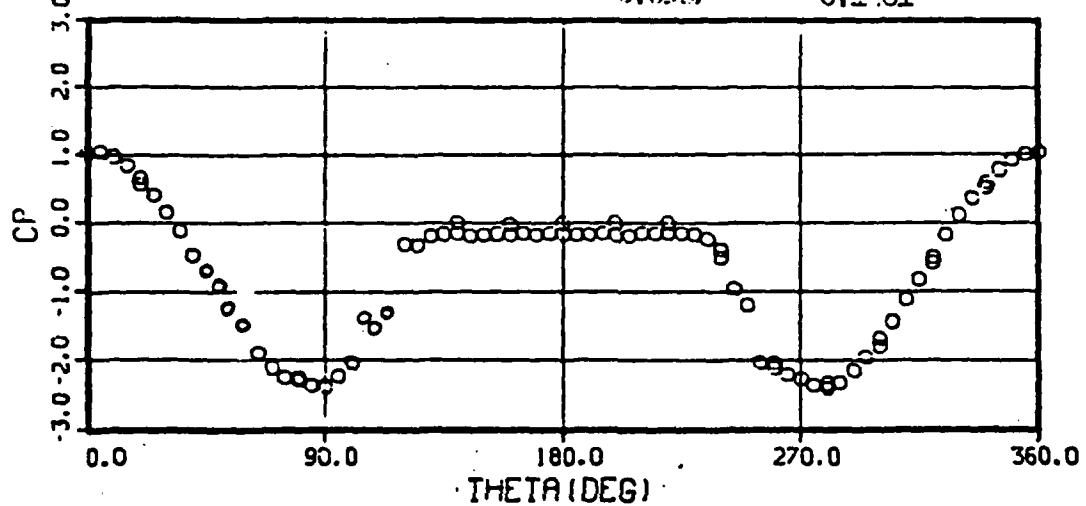
RUN 052 OIU- 8.4 +/- .00 RNDIU- .533 +/- .000  
 PIU- 2092. +/- .00 VIU- 85.66 +/- .000  
 MIU- .076 +/- .000 CL- 0.0411 CD- 0.16560



CP VALUES ALONG LONGITUDINAL RAYS AT  
 POLAR ANGLE OF 4DEG-0 64DEG-+ 124DEG-X.  
 THE 5 SETS OF POINTS AT EACH LOCATION  
 CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

SMOOTH CYLINDER

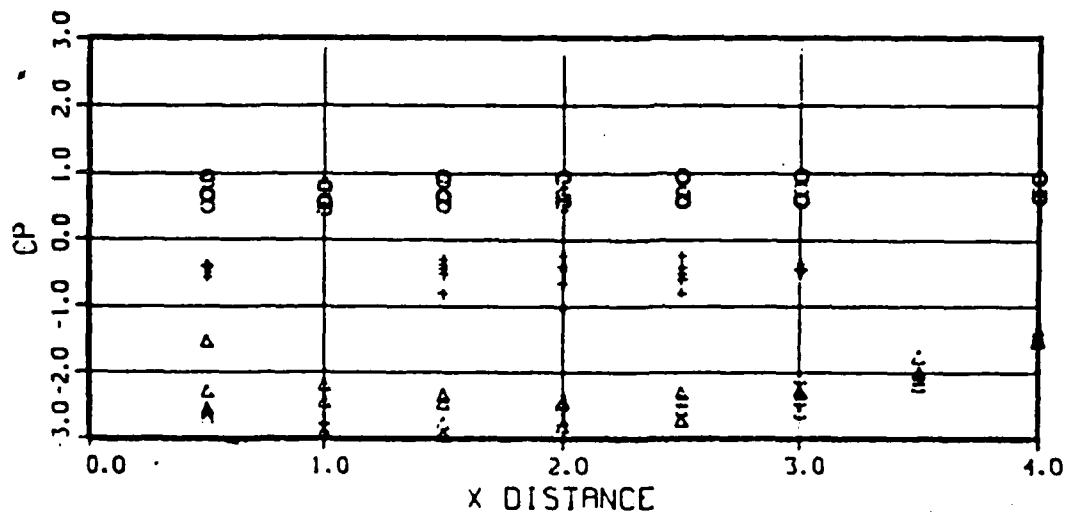
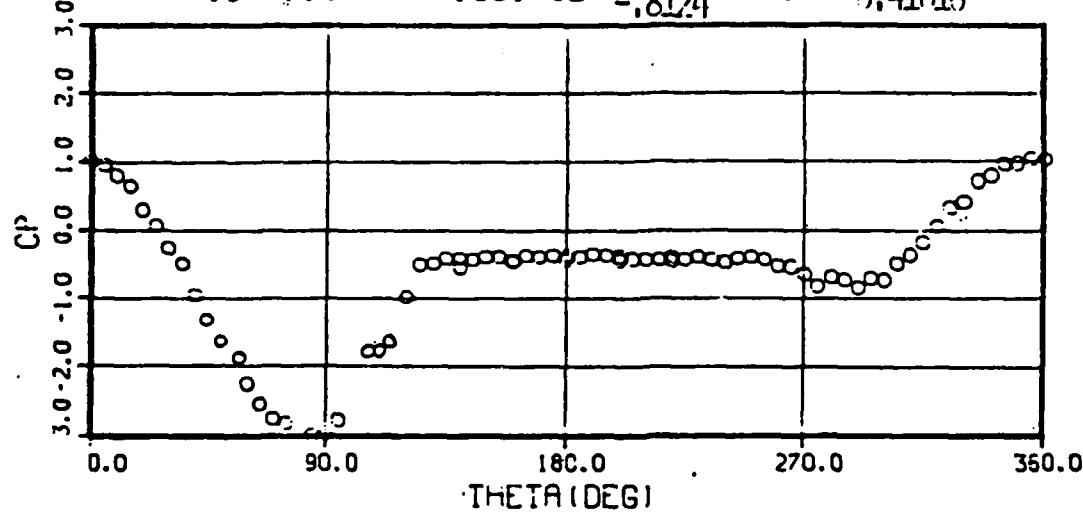
PUN 044 01U- 14.3 +/- .06 RND1U- .471 +/- .002  
PIU- 928. +/- 2.20 VIU-167.35 +/- .216  
MIU- .149 +/- .000 CL- 0.0597 CD- 0.1481



CP VALUES ALONG LONGITUDINAL RAYS AT  
POLAR ANGLE OF 40DEG-0 64DEG-+ 124DEG-X.  
THE 5 SETS OF POINTS AT EACH LOCATION  
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

SMOOTH CYLINDER

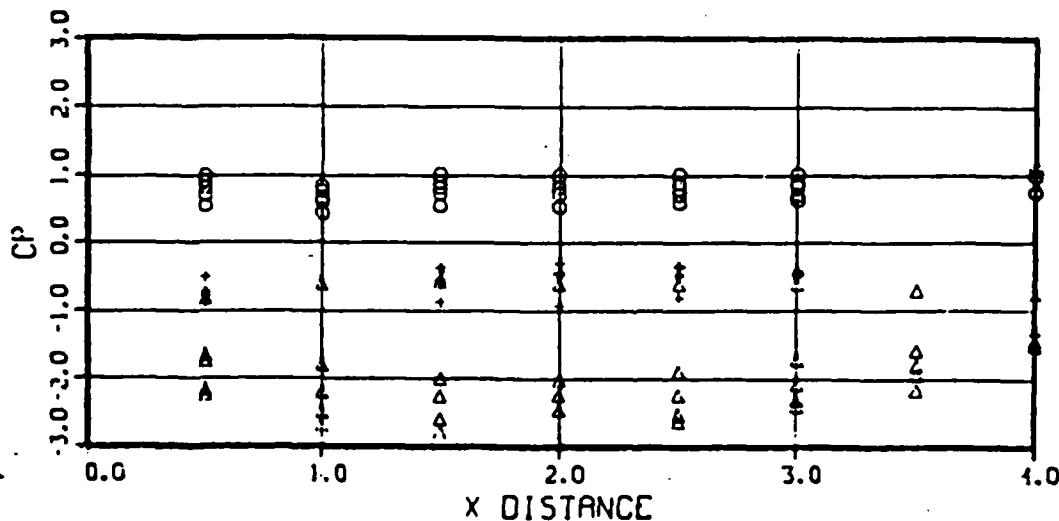
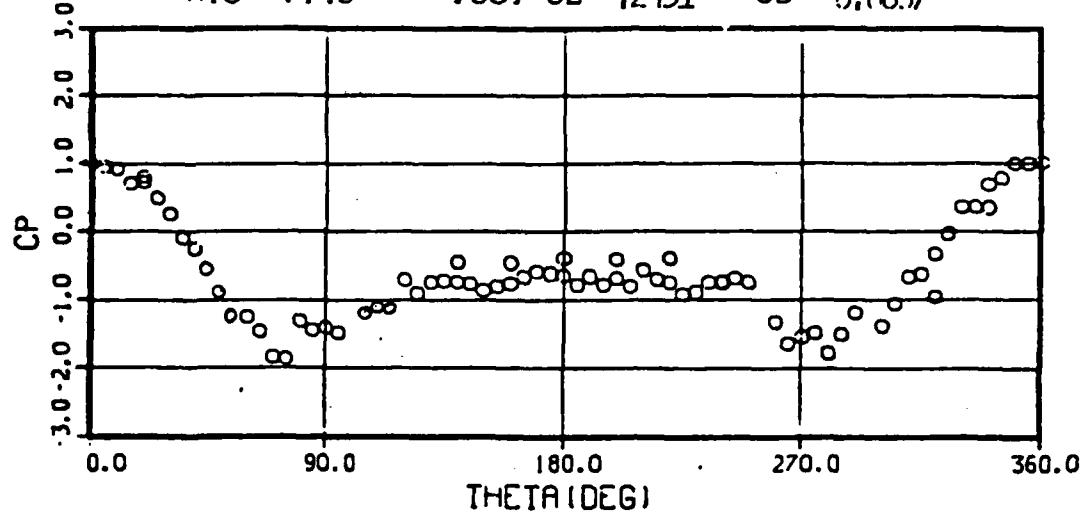
RUN 043 OIU- 12.9 +/- .18 RNDIU- .429 +/- .004  
PIU- 849. +/- 3.60 VIU-165.64 +/- .996  
MIU- .147 +/- .001 CL- -.8124 CD- 0.41610



CP VALUES ALONG LONGITUDINAL RAYS AT  
POLAR ANGLE OF 4DEG-0 64DEG-+ 124DEG-X.  
THE 5 SETS OF POINTS AT EACH LOCATION  
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

SMOOTH CYLINDER

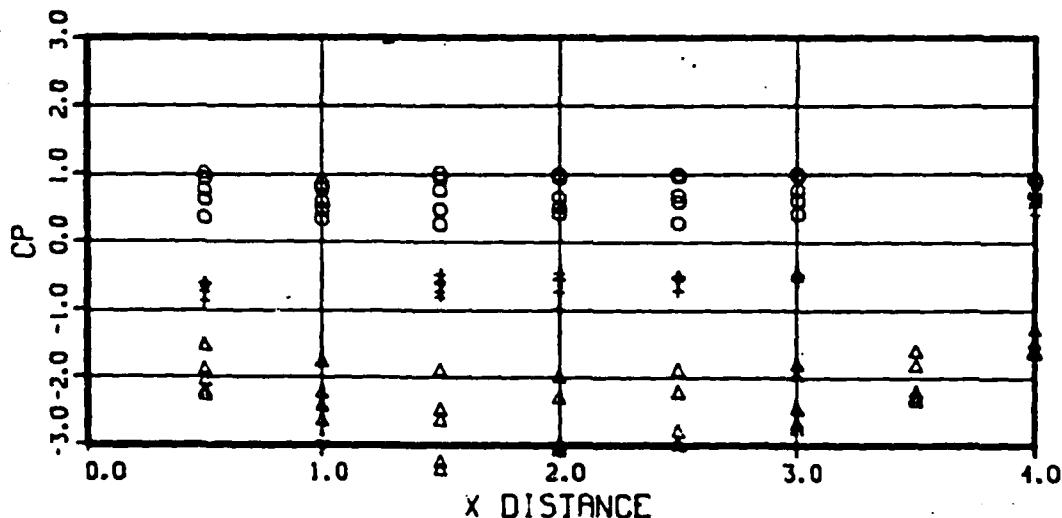
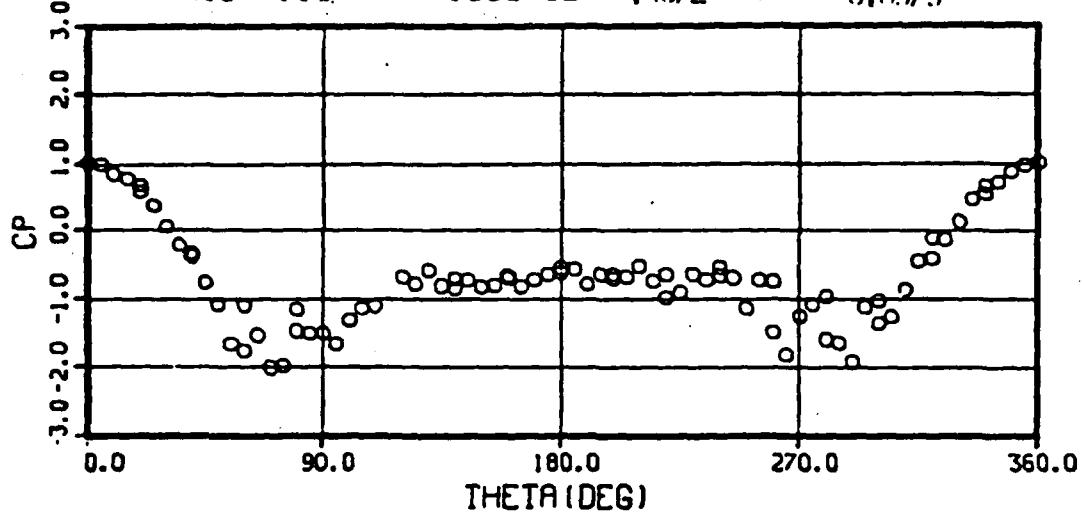
PUN 042 OIU- 12.8 +/- .26 RNDIU- .421 +/- .005  
 PIU- 830. +/- 4.20 VIU-166.32 +/- 1.198  
 MIU- .148 +/- .001 CL- .2451 CD- 0.6897



CP VALUES ALONG LONGITUDINAL RAYS AT  
 POLAR ANGLE OF 4DEG-0 64DEG-- 124DEG-X.  
 THE 5 SETS OF POINTS AT EACH LOCATION  
 CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

**SMOOTH CYLINDER**

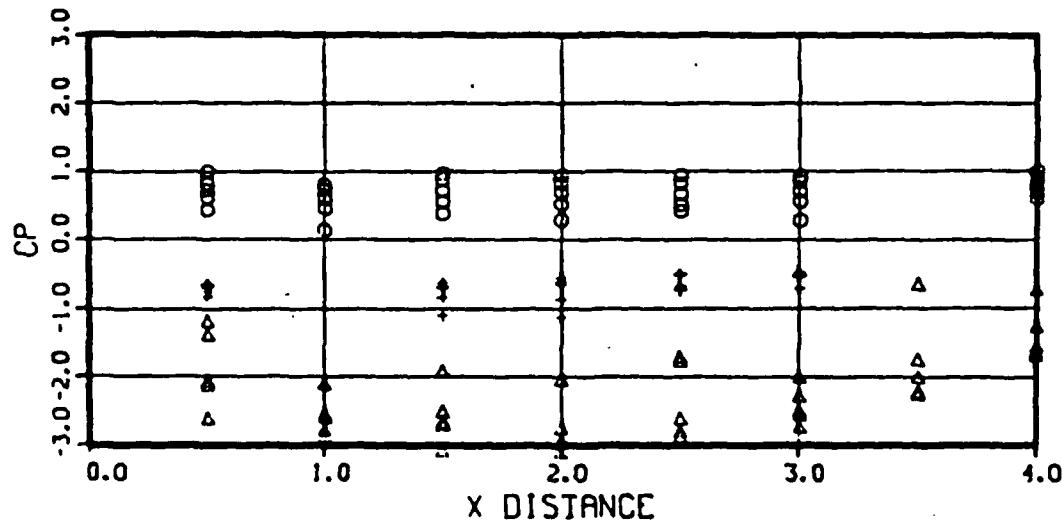
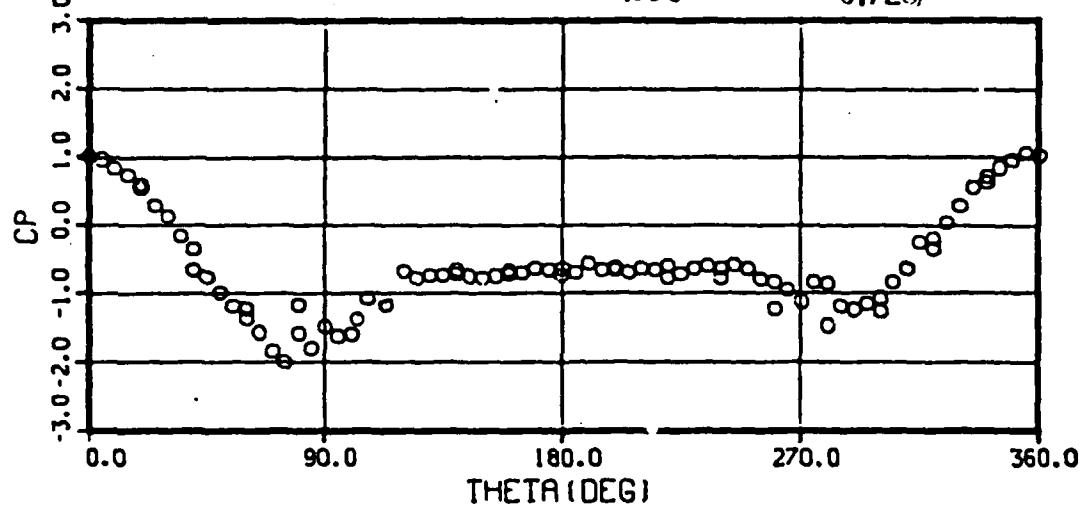
RUN 041 O1U- 12.5 +/- .06 RNDIU- .414 +/- .003  
 PIU- 820. +/- 4.80 VIU-165.47 +/- .312  
 MIU- .147 +/- .000 CL- -.4872 CD- 0.6979



CP VALUES ALONG LONGITUDINAL RAYS AT  
 POLAR ANGLE OF 4DEG-0 61DEG-+ 121DEG-X.  
 THE 5 SETS OF POINTS AT EACH LOCATION  
 CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

SMOOTH CYLINDER

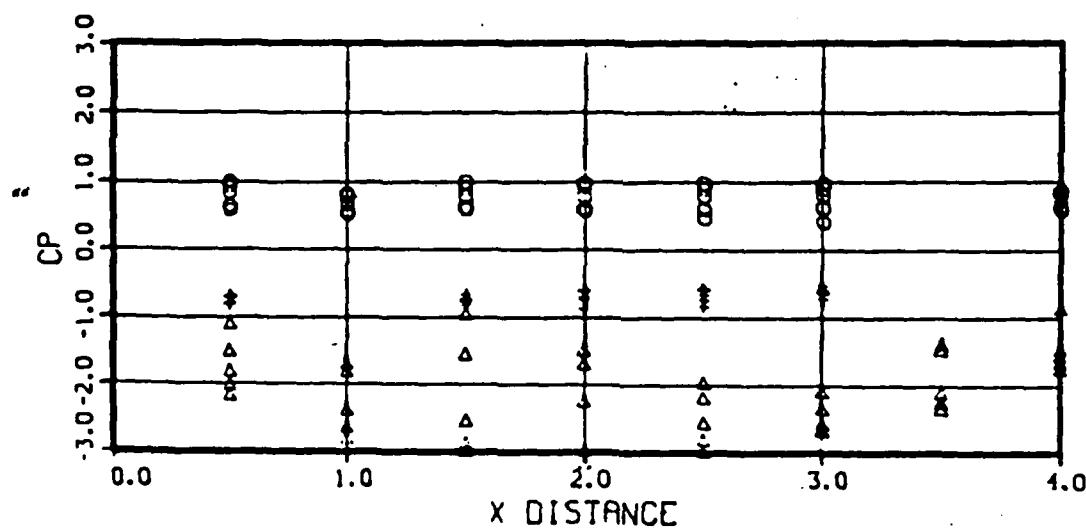
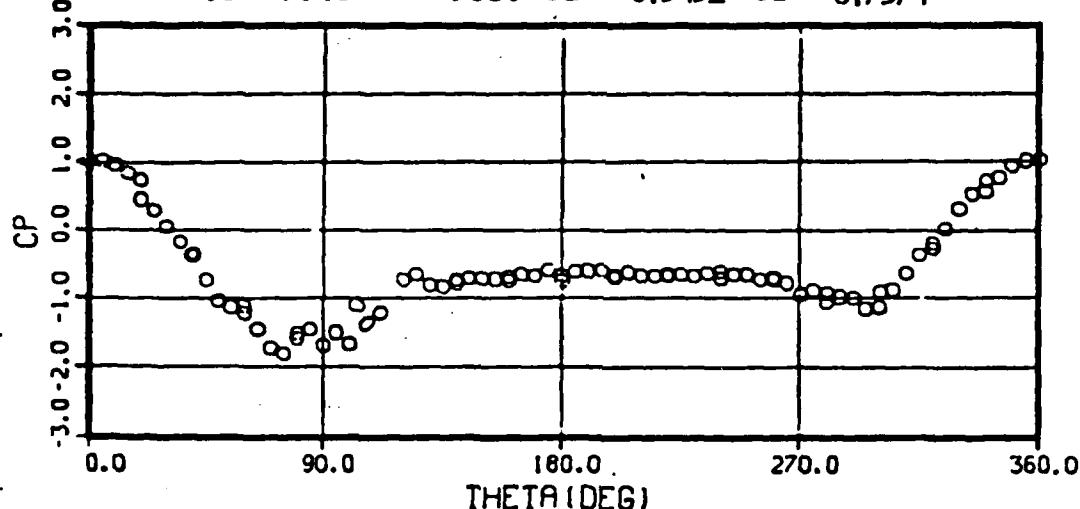
RUN 040 OIU- 12.3 +/- .18 RNDIU- .408 +/- .003  
PIU- 811. +/- 3.80 VIU-165.30 +/- .980  
MIU- .147 +/- .001 CL- .336 CD- 0.7287



CP VALUES ALONG LONGITUDINAL RAYS AT  
POLAR ANGLE OF 4DEG-0 64DEG--> 124DEG-X.  
THE 5 SETS OF POINTS AT EACH LOCATION  
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

SMOOTH CYLINDER

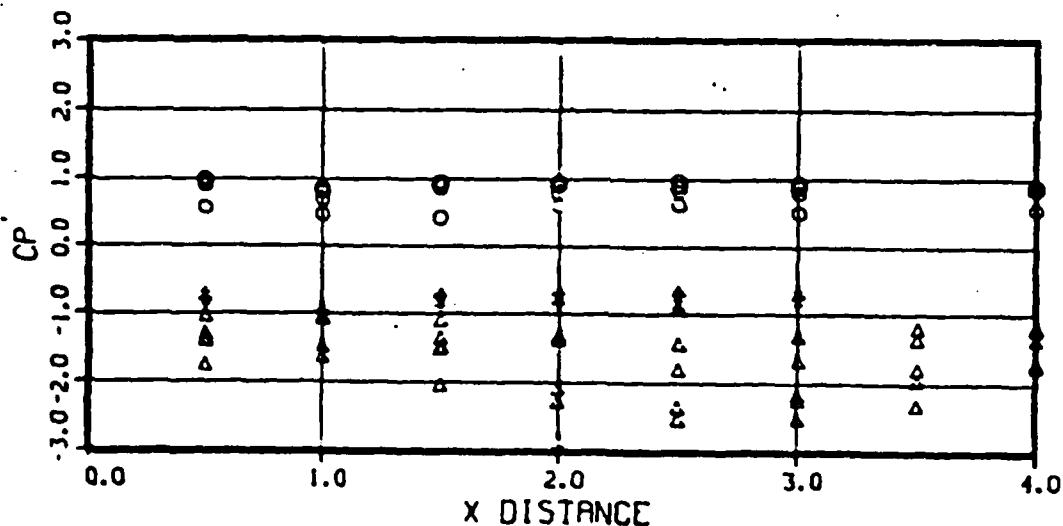
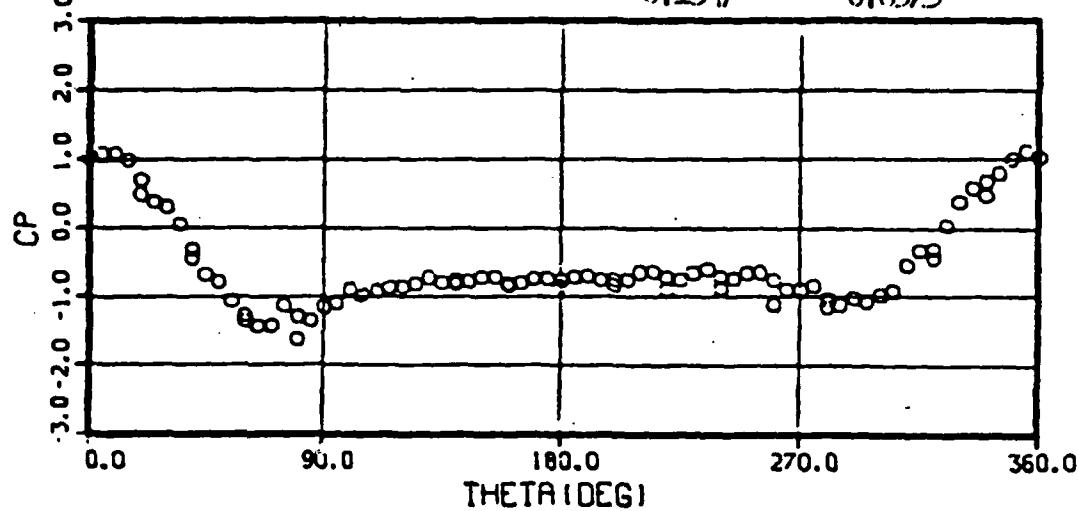
RUN 039 O1U- 12.1 +/- .00 RNDIU- .400 +/- .002  
P1U- 792. +/- 3.80 VIU-165.95 +/- .314  
MIU- .148 +/- .001 CL- -0.3431 CD- 0.7574



CP VALUES ALONG LONGITUDINAL RAYS AT  
POLAR ANGLE OF 4DEG-0 64DEG-+ 124DEG-X.  
THE 5 SETS OF POINTS AT EACH LOCATION  
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

SMOOTH CYLINDER

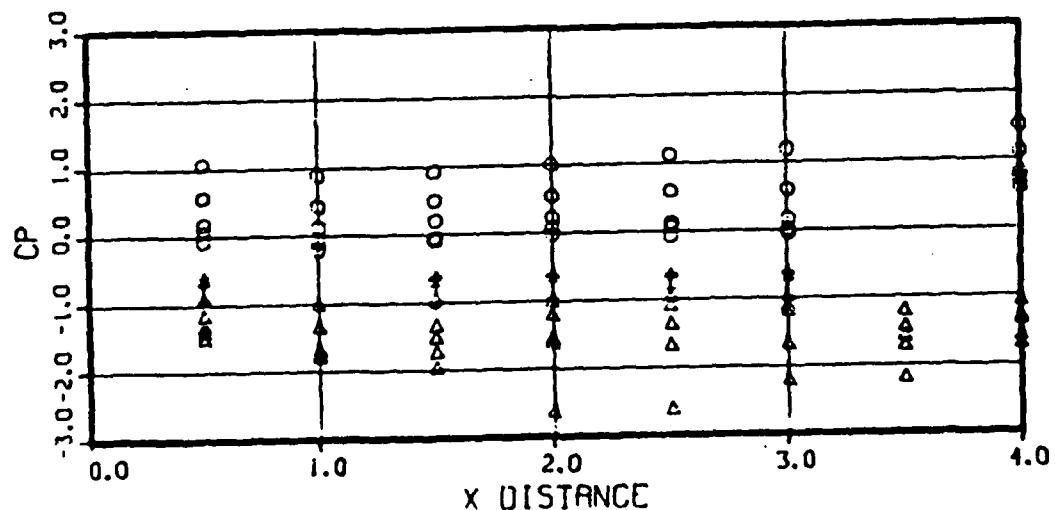
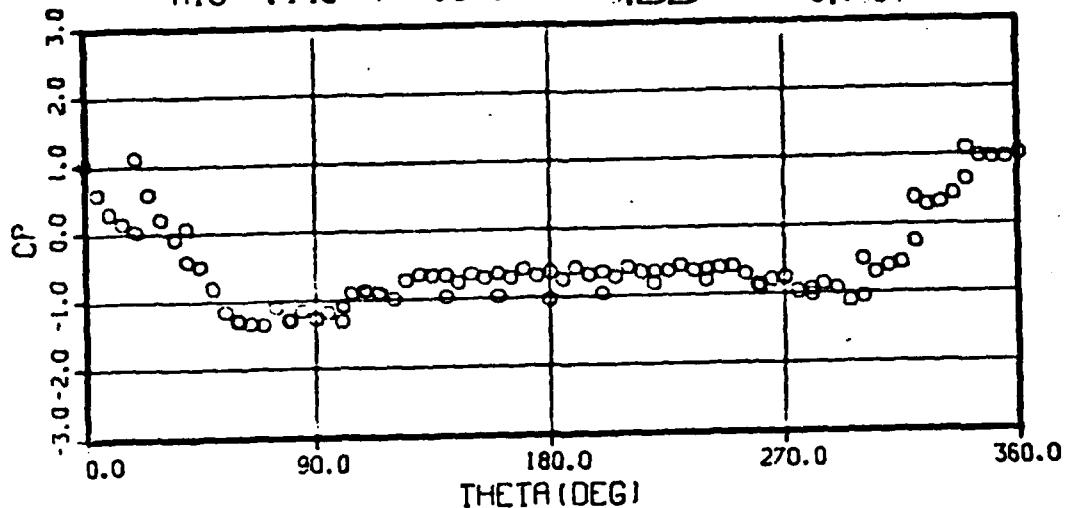
RUN 038 OIU- 11.6 +/- .10 RNDIU- .386 +/- .003  
PIU- 769. +/- 4.60 VIU- 164.93 +/- .574  
MIU- .147 +/- .001 CL- -0.1547 CO- 0.8523



CP VALUES ALONG LONGITUDINAL RAYS AT  
POLAR ANGLE OF 40DEG-0 64DEG-+ 124DEG-X.  
THE 5 SETS OF POINTS AT EACH LOCATION  
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

SMOOTH CYLINDER

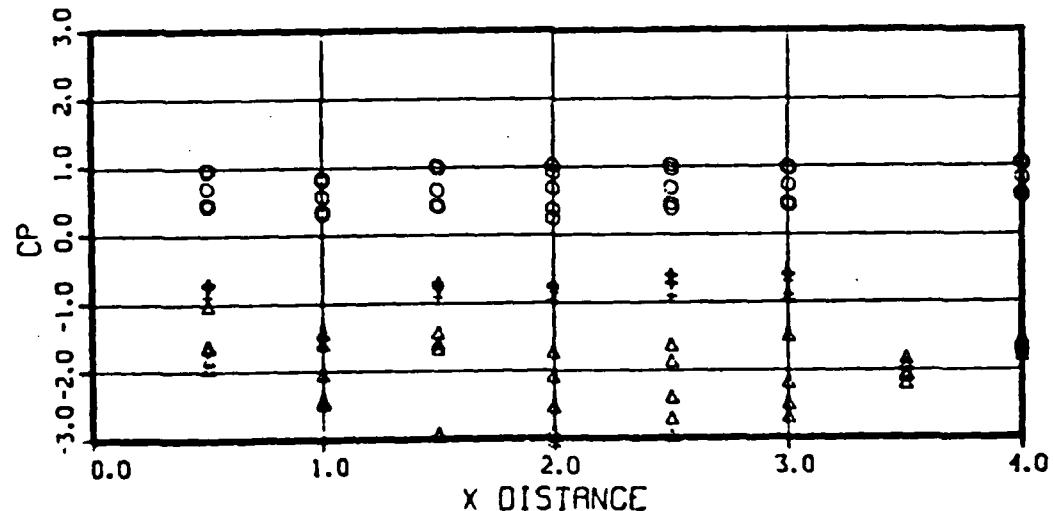
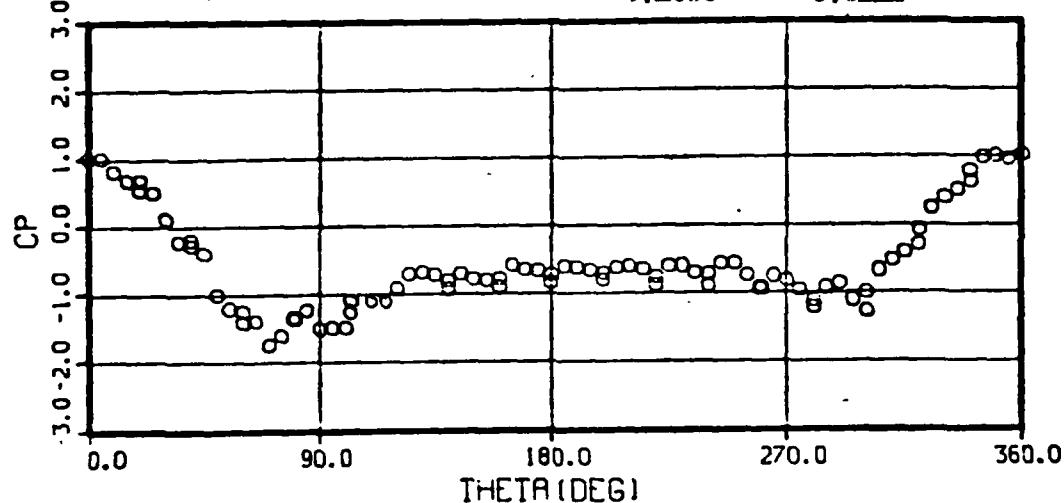
RUN 049 OIU- 11.4 +/- .12 RNDIU- .384 +/- .003  
PIU- 767. +/- 8.20 VIU-163.47 +/- 1.246  
MIU- .146 +/- .001 CL- -.2523 CD- 0.8064



CP VALUES ALONG LONGITUDINAL RAYS AT  
POLAR ANGLE OF 4DEG-0 64DEG-- 124DEG-X.  
THE 5 SETS OF POINTS AT EACH LOCATION  
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

SMOOTH CYLINDER

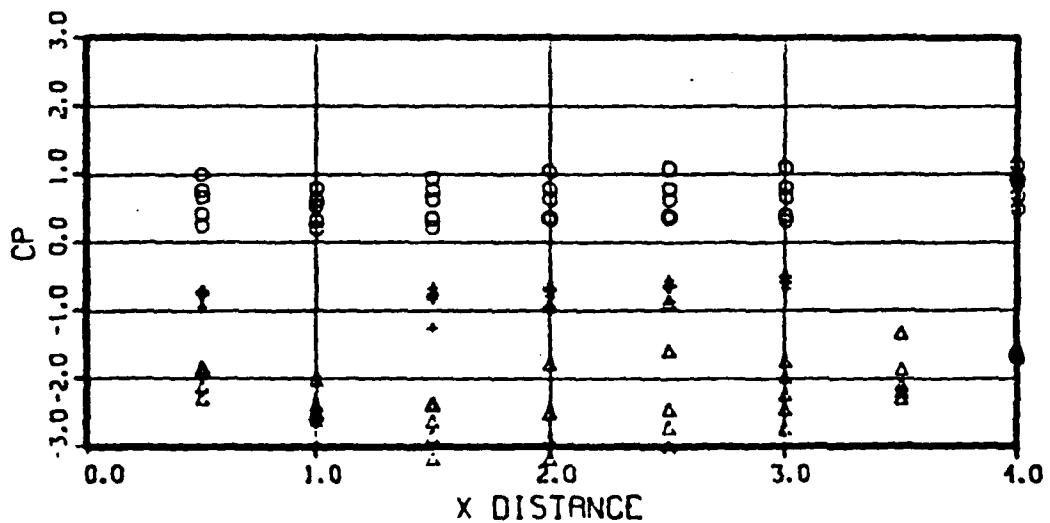
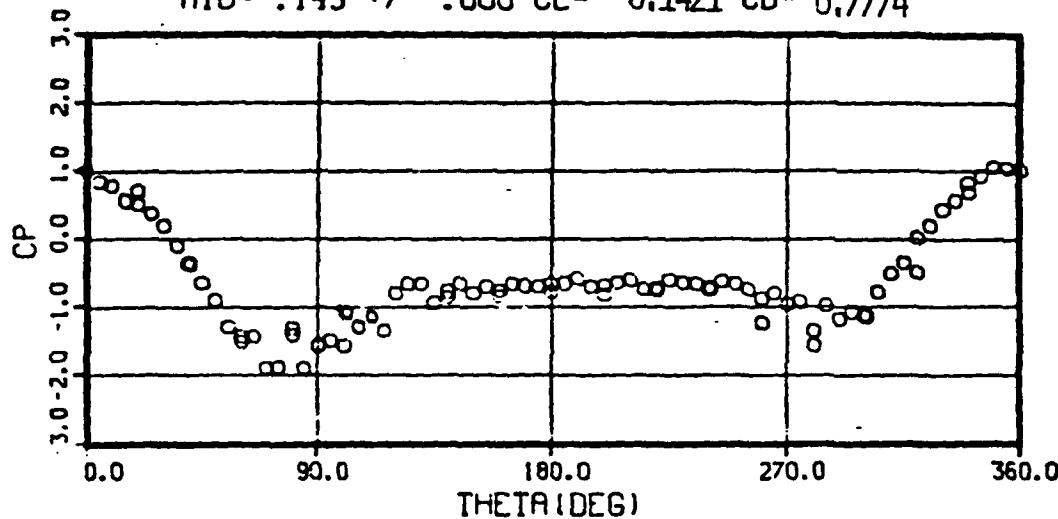
RUN 048 QIU- 11.8 +/- .08 RNDIU- .395 +/- .002  
PIU- 785. +/- 2.40 VIU-164.22 +/- .388  
MIU- .146 +/- .001 CL- -0.1898 CD- 0.8222



CP VALUES ALONG LONGITUDINAL RAYS AT  
POLAR ANGLE OF 4DEG-0 64DEG--+ 124DEG-X.  
THE 5 SETS OF POINTS AT EACH LOCATION  
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

SMOOTH CYLINDER

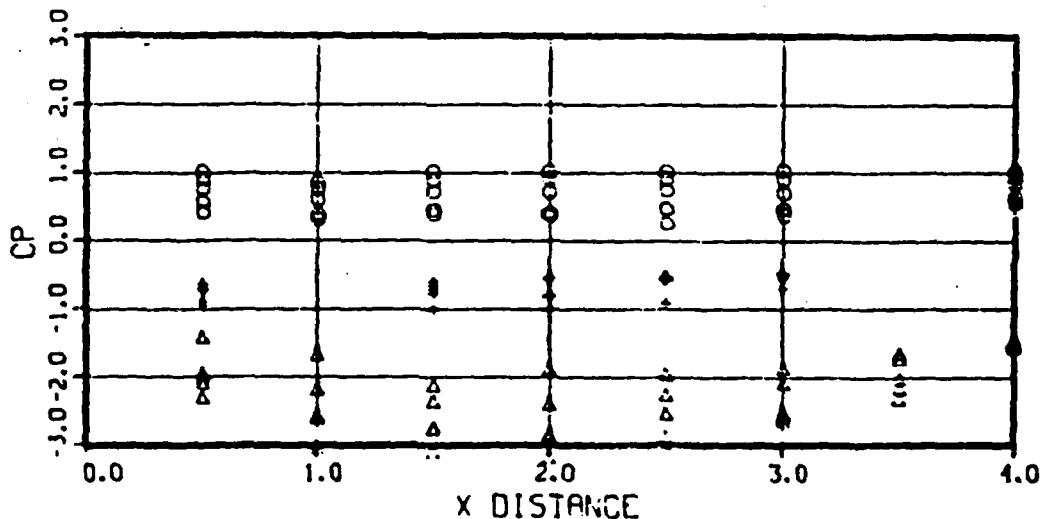
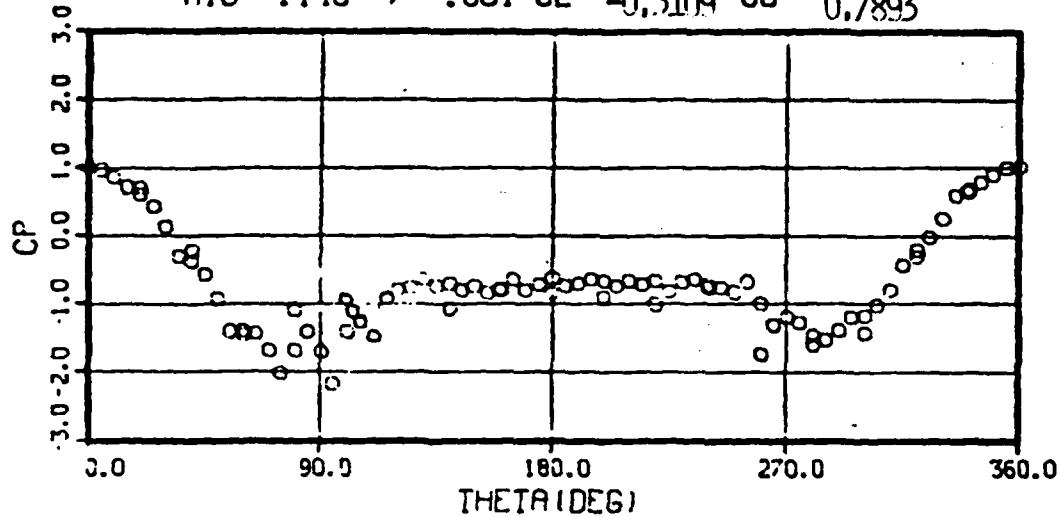
RUN 047 O1U- 11.9 +/- .08 RNDIU- .403 +/- .002  
PIU- 807. +/- 2.20 VIU-162.86 +/- .172  
MIU- .145 +/- .000 CL- -0.1421 CD- 0.7774



CP VALUES ALONG LONGITUDINAL RAYS AT  
POLAR ANGLE OF 4DEG-0 64DEG-+ 124DEG-X.  
THE 5 SETS OF POINTS AT EACH LOCATION  
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

SMOOTH CYLINDER

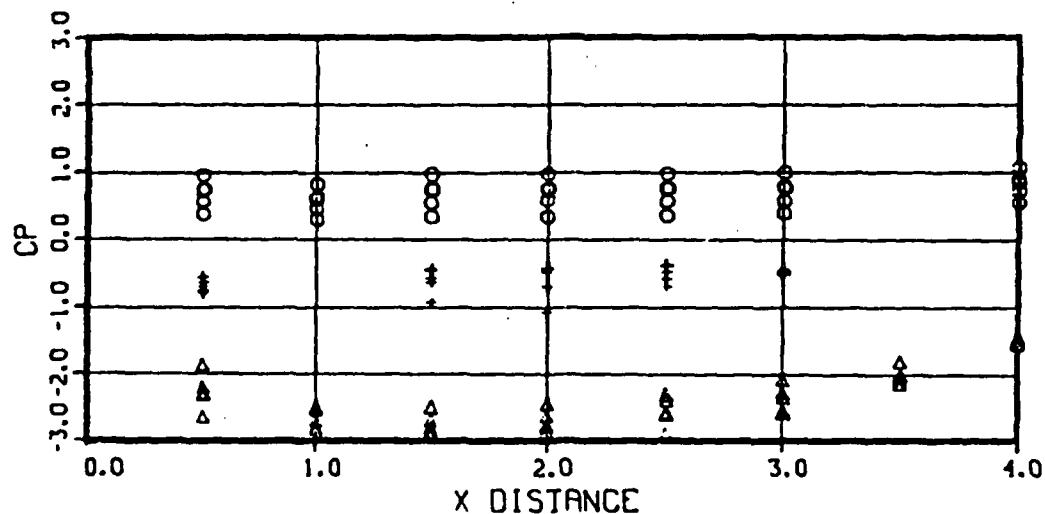
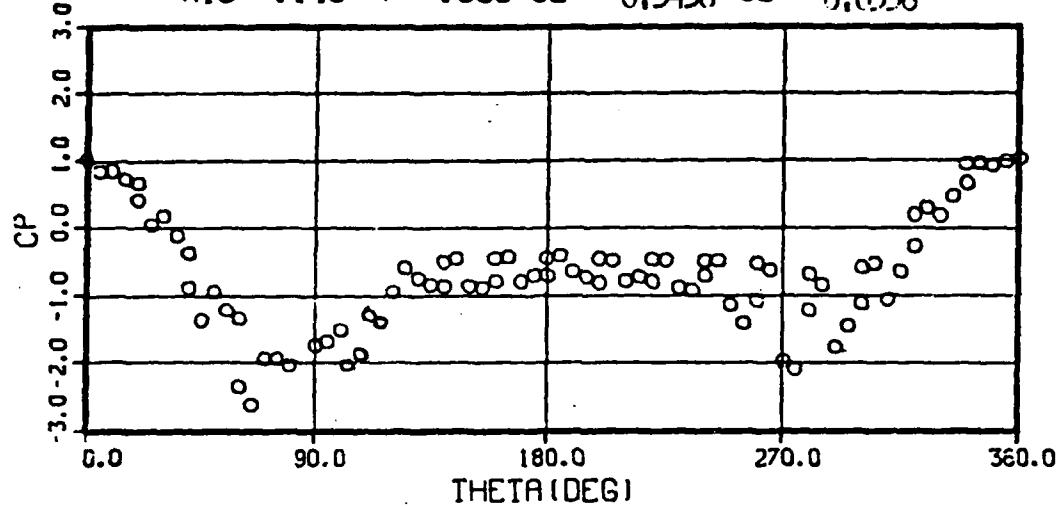
RUN 046 CIU- 12.3 +/- .10 RNDIU- .415 +/- .002  
PIU- 828. +/- 3.40 VIU- 163.43 +/- .352  
MIU- .146 +/- .001 CL- -0.3109 CD- 0.7893



CP VALUES ALONG LONGITUDINAL RAYS AT  
POLAR ANGLE OF 40DEG-0 64DEG-+ 124DEG-X.  
THE 5 SETS OF POINTS AT EACH LOCATION  
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

SMOOTH CYLINDER

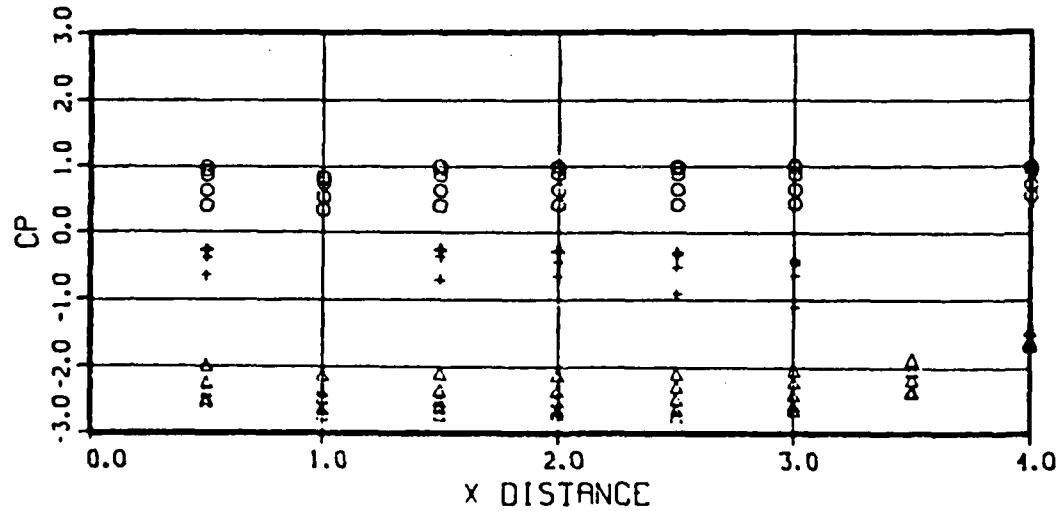
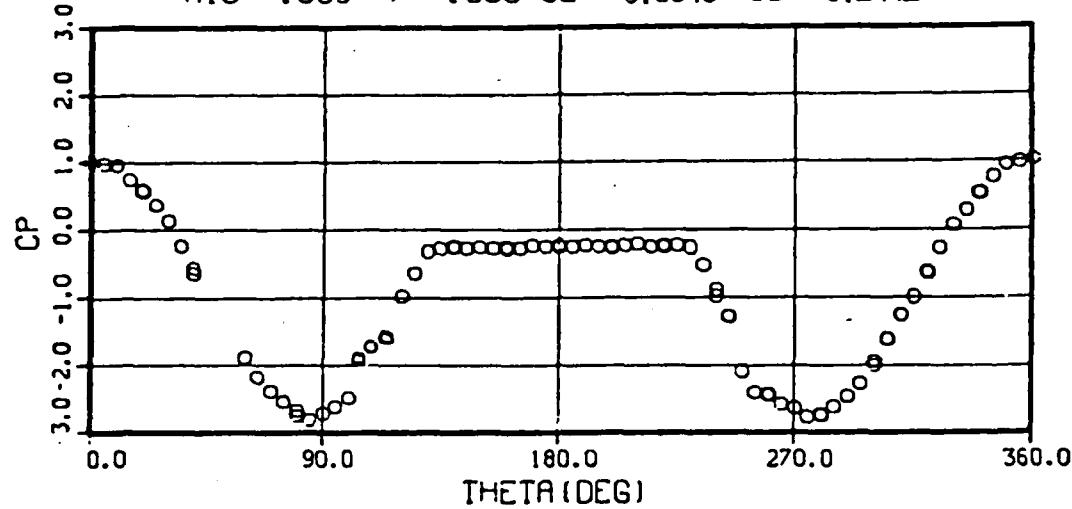
RUN 045 01U- 12.5 +/- .00 RND1U- .422 +/- .000  
PIU- 842. +/- 2.60 VIU-163.54 +/- .198  
MIU- .146 +/- .000 CL- -0.5458 CD- 0.6358



CP VALUES ALONG LONGITUDINAL RAYS AT  
POLAR ANGLE OF 4DEG-0 64DEG-- 124DEG-X.  
THE 5 SETS OF POINTS AT EACH LOCATION  
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

SMOOTH CYLINDER

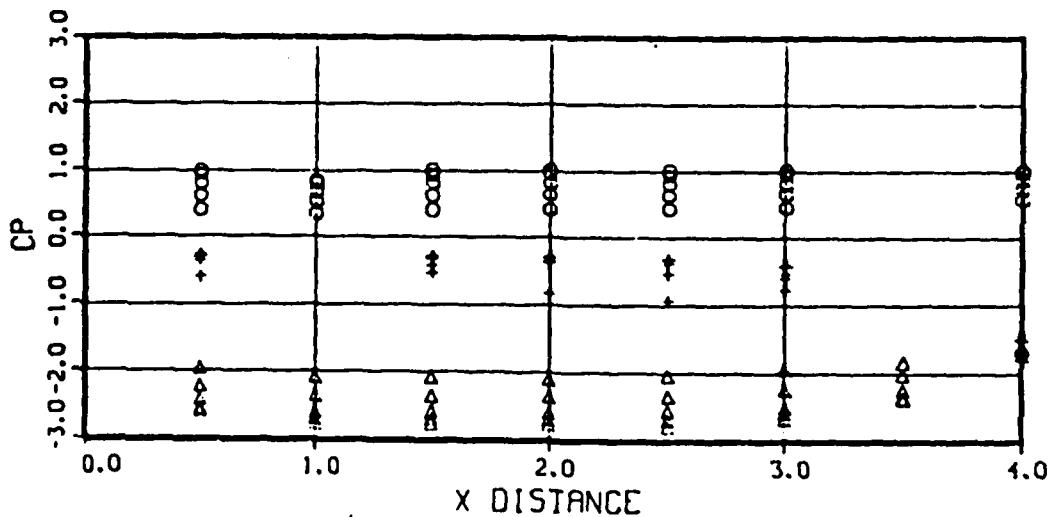
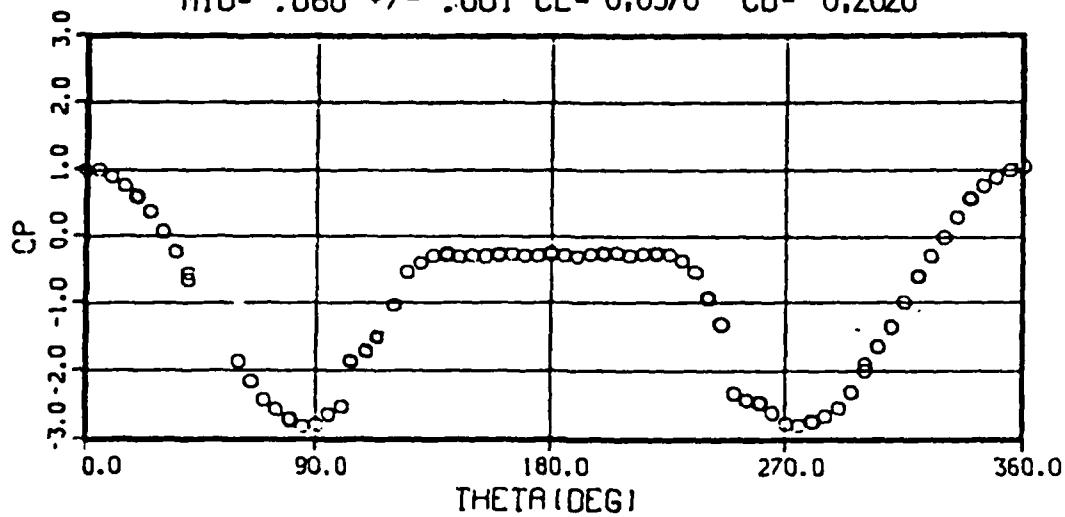
RUN 054 OIU- 5.8 +/- .00 RNDIU- .444 +/- .000  
PIU- 2094. +/- .00 VIU- 71.18 +/- .006  
MIU- .063 +/- .000 CL- 0.0848 CD- 0.2441



CP VALUES ALONG LONGITUDINAL RAYS AT  
POLAR ANGLE OF 40DEG-0 64DEG-+ 124DEG-X.  
THE 5 SETS OF POINTS AT EACH LOCATION  
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

SMOOTH CYLINDER

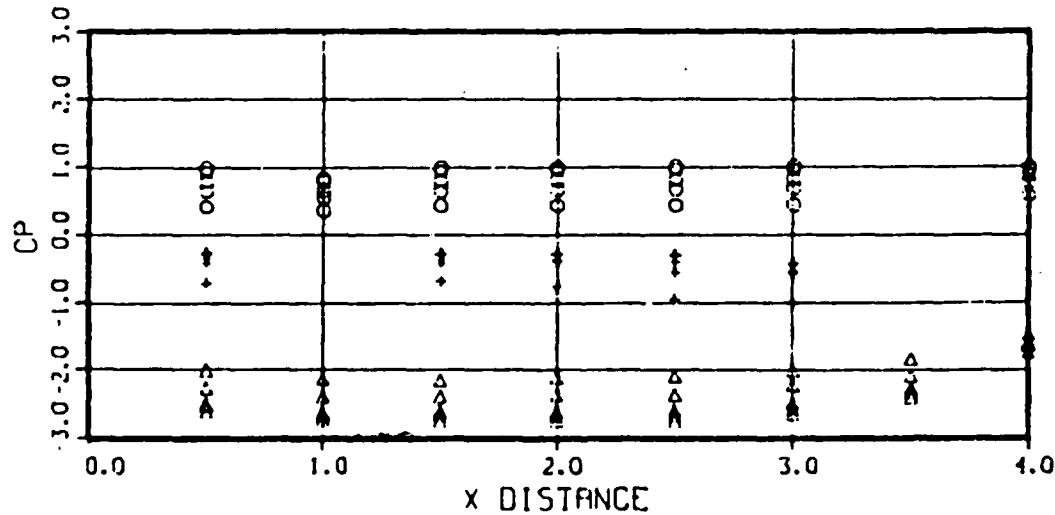
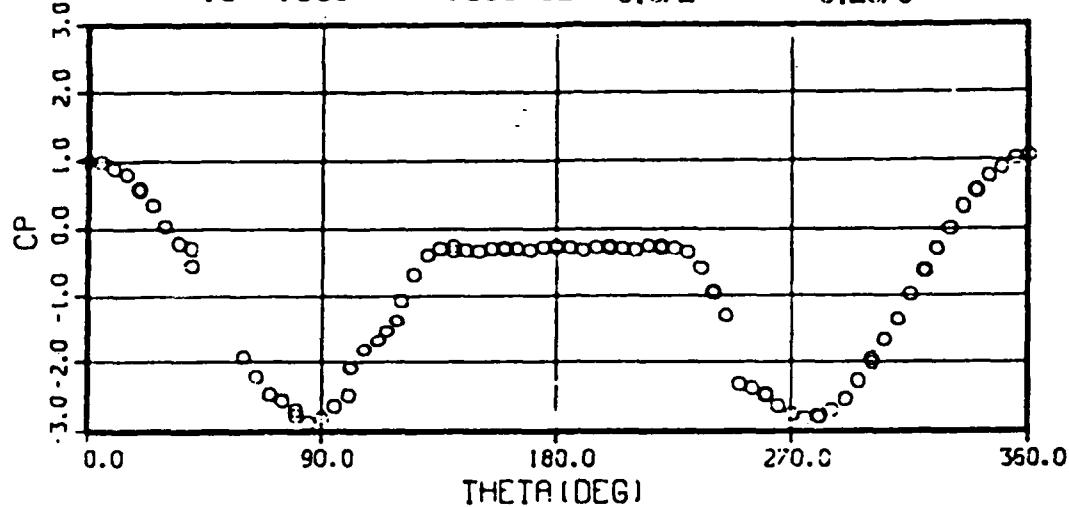
RUN 055 Q1U- .5.3 +/- .08 RNDIU- .427 +/- .002  
P1U- 2095. +/- .00 V1U- 68.41 +/- .392  
MIU- .060 +/- .001 CL- 0.0976 CD- 0.2626



CP VALUES ALONG LONGITUDINAL RAYS AT  
POLAR ANGLE OF 40DEG-0 64DEG-+ 124DEG-X.  
THE 5 SETS OF POINTS AT EACH LOCATION  
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

SMOOTH CYLINDER

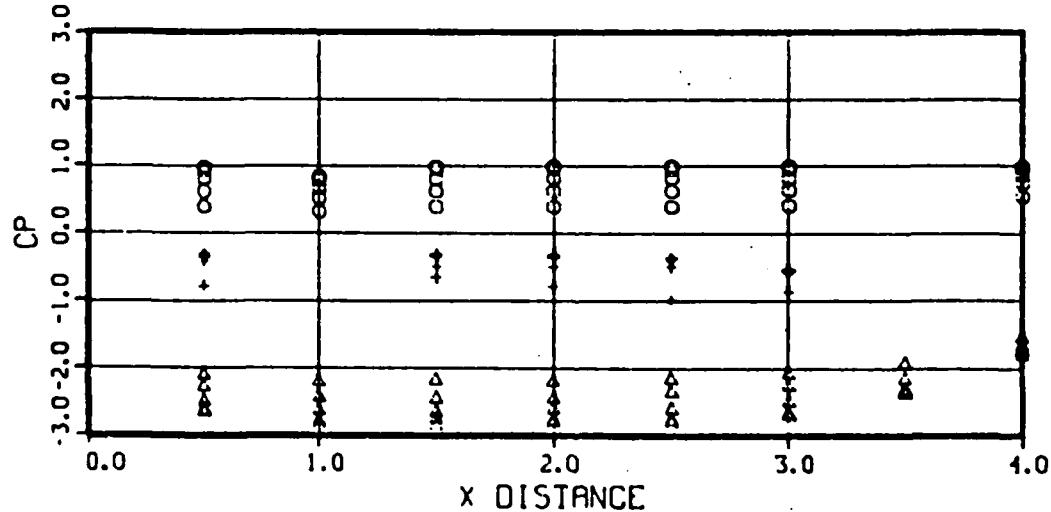
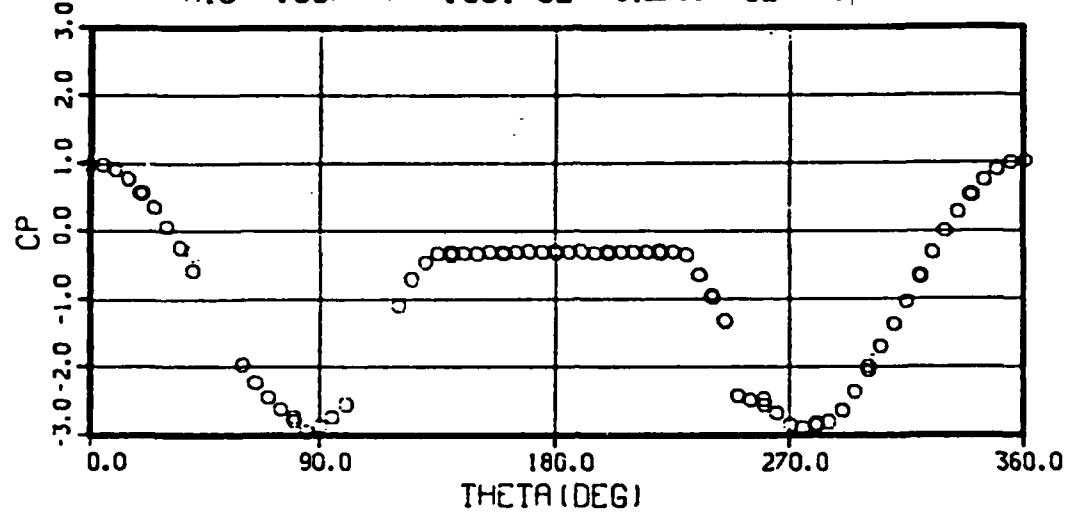
RUN 056 O1U- 5.3 +/- .00 RNDIU- .423 +/- .000  
PIU- 2095. +/- .00 VIU- 67.81 +/- .006  
MIU- .060 +/- .000 CL- 0.072 CD- 0.2676



CP VALUES ALONG LONGITUDINAL RAYS AT  
POLAR ANGLE OF 4DEG-0 64DEG-+ 124DEG-X.  
THE 5 SETS OF POINTS AT EACH LOCATION  
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

SMOOTH CYLINDER

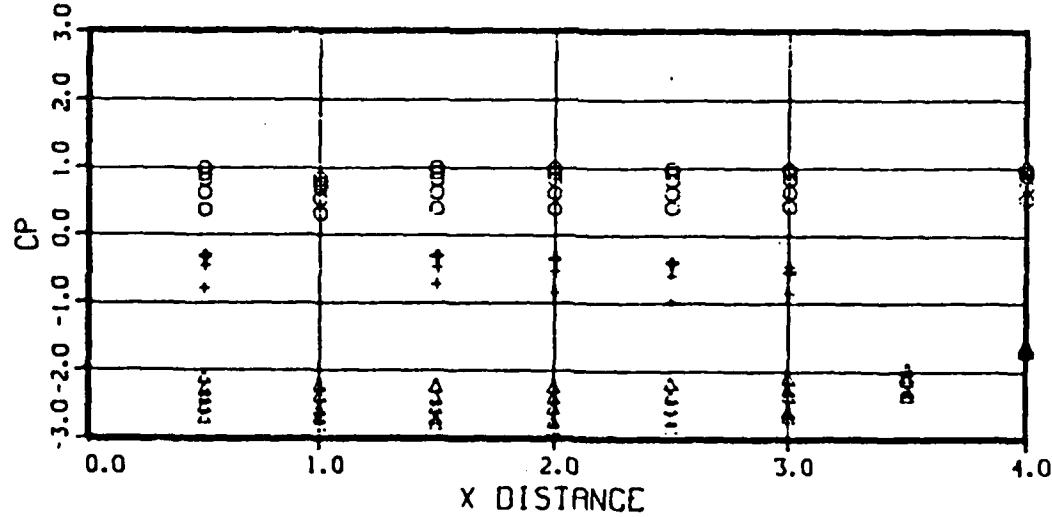
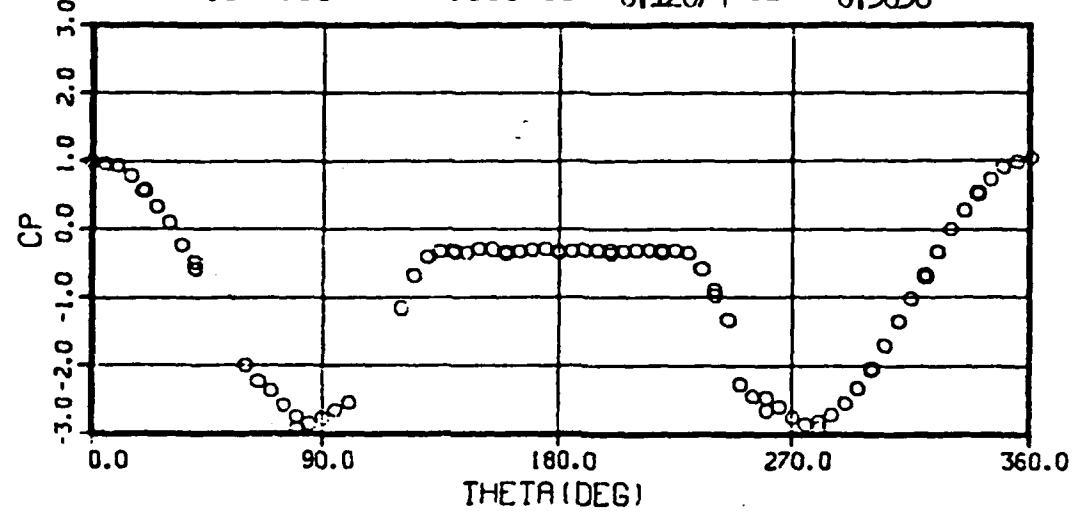
RUN 057 O1U- 4.8 +/- .08 RND1U- .406 +/- .002  
P1U- 2095. +/- .00 VIU- 64.88 +/- 410  
M1U- .057 +/- .001 CL- 0.1599 CD- 0.3105



CP VALUE'S ALONG LONGITUDINAL RAYS AT  
POLAR ANGLE OF 4DEG-0 64DEG-+ 124DEG-X.  
THE 5 SETS OF POINTS AT EACH LOCATION  
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

SMOOTH CYLINDER

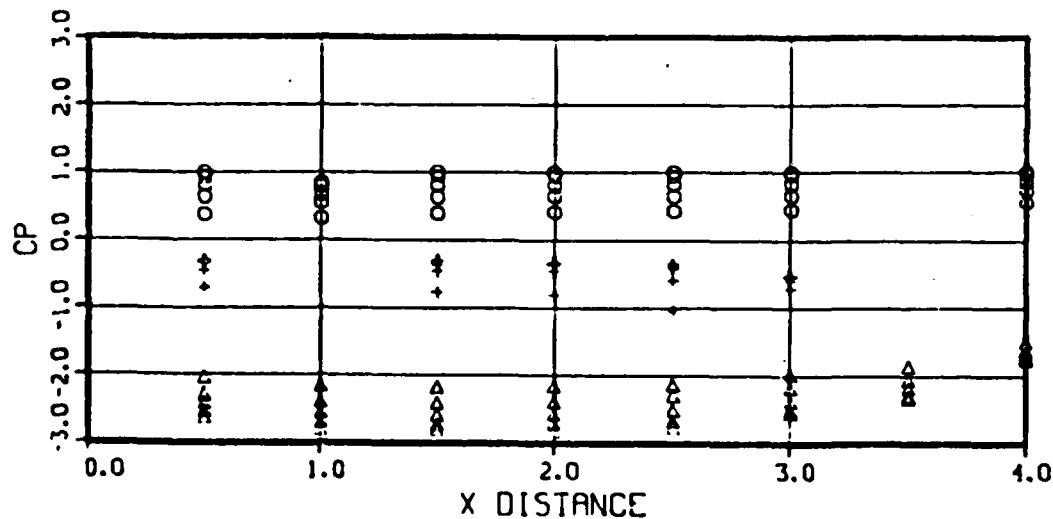
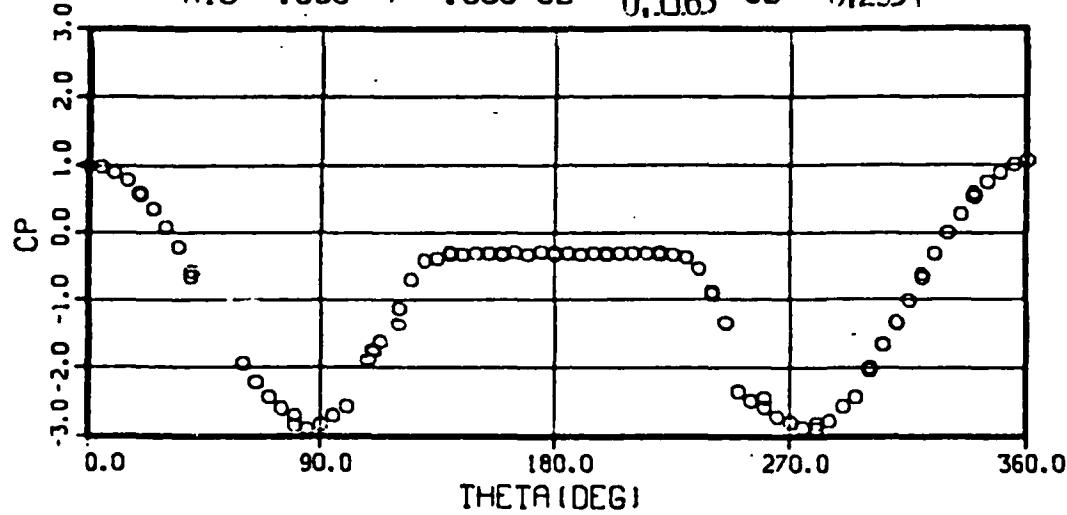
RUN 058 O1U- 4.8 +/- .06 RND1U- .404 +/- .002  
P1U- 2095. +/- .00 V1U- 64.56 +/- .320  
M1U- .057 +/- .000 CL- 0.12674 CD- 0.3038



CP VALUES ALONG LONGITUDINAL RAYS AT  
POLAR ANGLE OF 4DEG-0 64DEG--+ 124DEG-X.  
THE 5 SETS OF POINTS AT EACH LOCATION  
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

SMOOTH CYLINDER

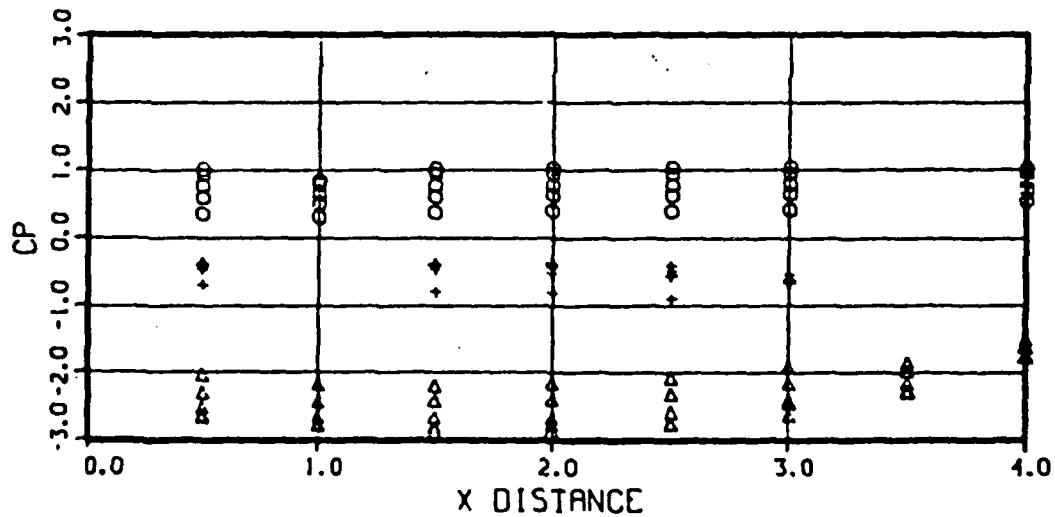
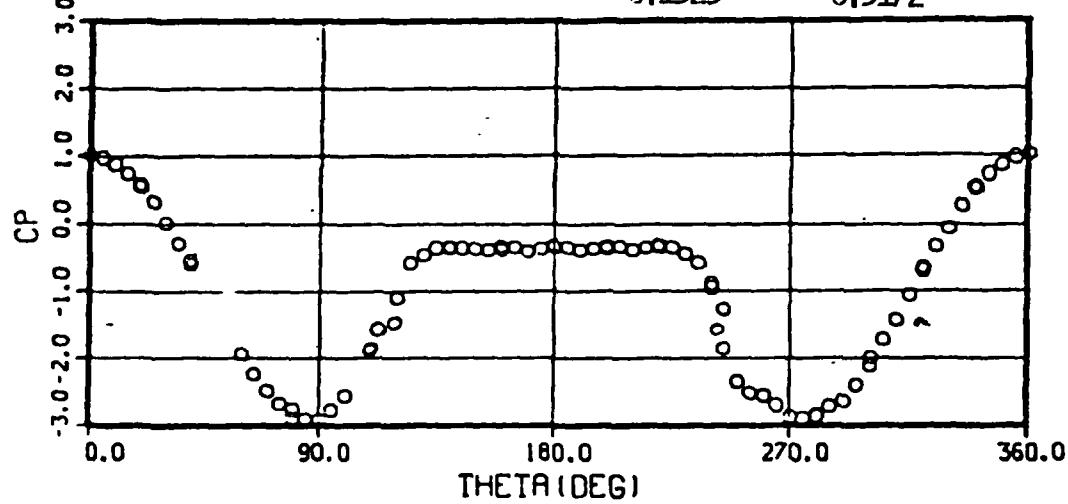
RUN 059 01U- 4.6 +/- .00 RND1U- .395 +/- .000  
PIU- 2096. +/- .00 VIU- 63.19 +/- .006  
MIU- .056 +/- .000 CL- 0.1163 CD- 0.2954



CP VALUES ALONG LONGITUDINAL RAYS AT  
POLAR ANGLE OF 40DEG-0 64DEG-+ 124DEG-X.  
THE 5 SETS OF POINTS AT EACH LOCATION  
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

SMOOTH CYLINDER

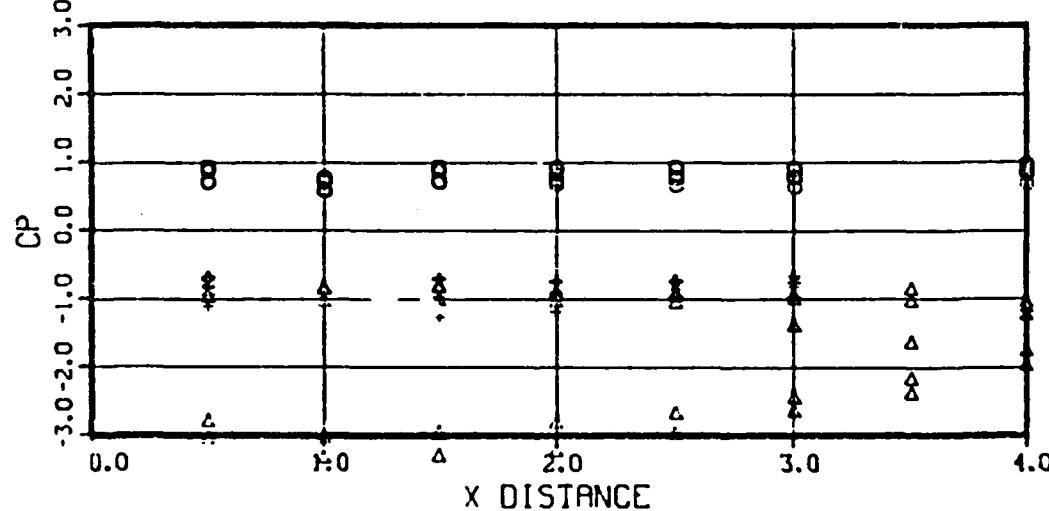
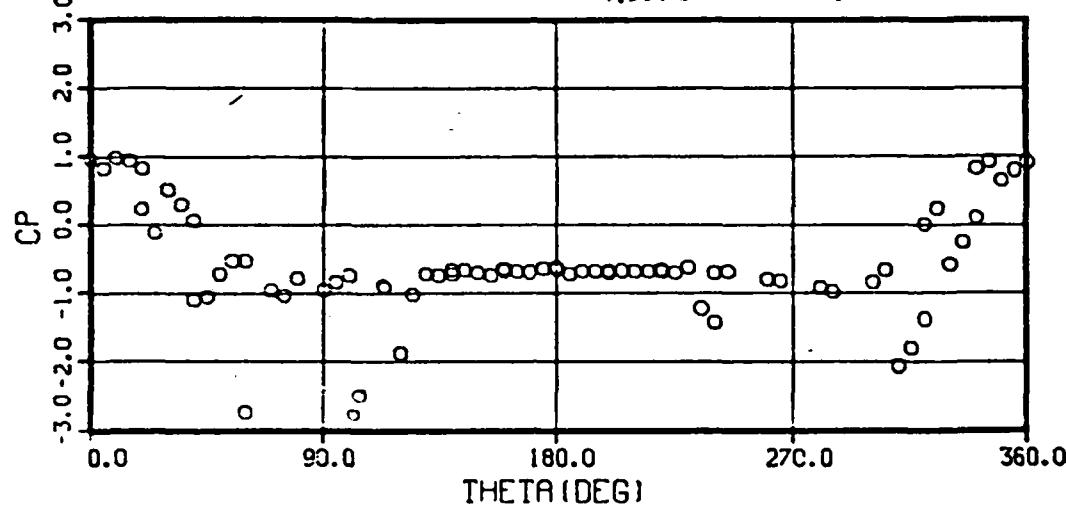
RUN 060 01U- 4.3 +/- .00 RND1U- .382 +/- .000  
PIU- 2096. +/- .00 VIU- 61.04 +/- .000  
MIU- .054 +/- .000 CL- 0.1325 CD- 0.3172



CP VALUES ALONG LONGITUDINAL RAYS AT  
POLAR ANGLE OF 4DEG-Q 64DEG-- 124DEG-X.  
THE 5 SETS OF POINTS AT EACH LOCATION  
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

SMOOTH CYLINDER

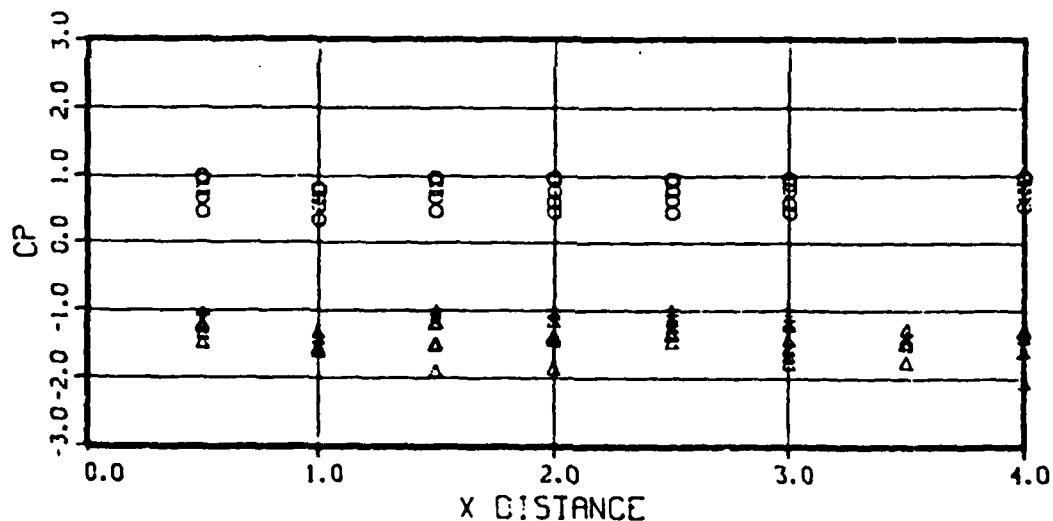
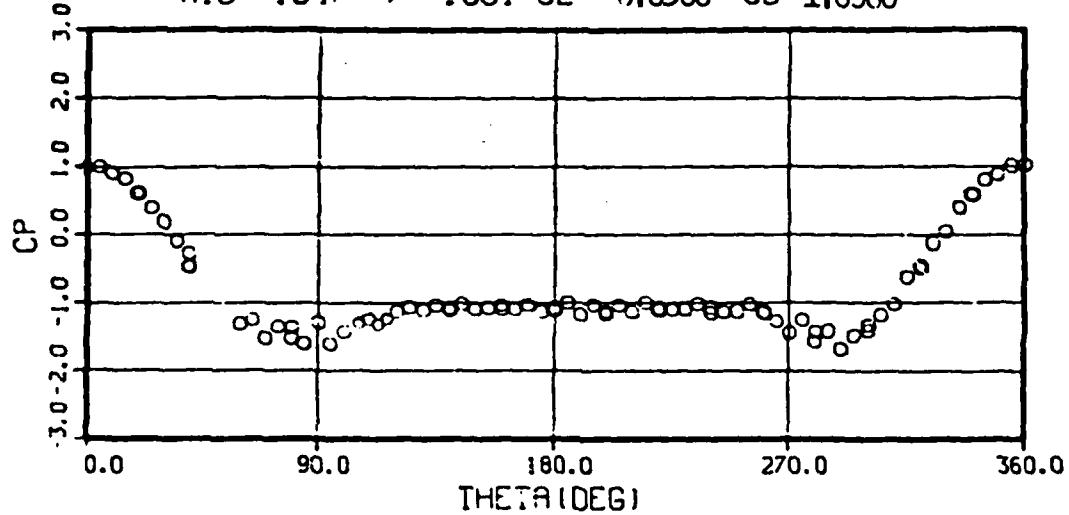
RUN 061 0IU- 4.1 +/- .00 RNDIU- .372 +/- .000  
PIU- 2096. +/- .00 VIU- 59.38 +/- .008  
MIU- .053 +/- .000 CL-0.3376 CD- 0.5409



CP VALUES ALONG LONGITUDINAL RAYS AT  
POLAR ANGLE OF 4DEG-0 64DEG--> 124DEG-X.  
THE 5 SETS OF POINTS AT EACH LOCATION  
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

SMOOTH CYLINDER

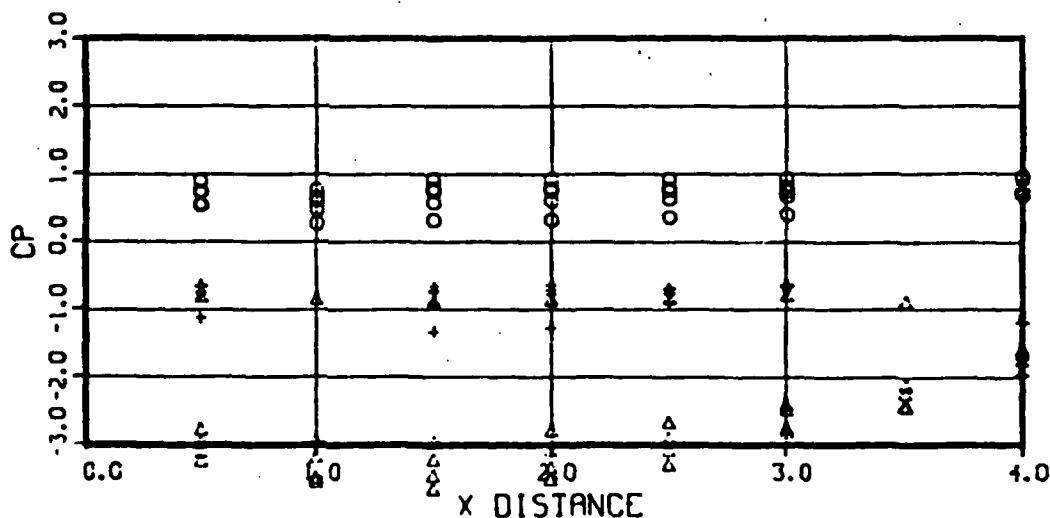
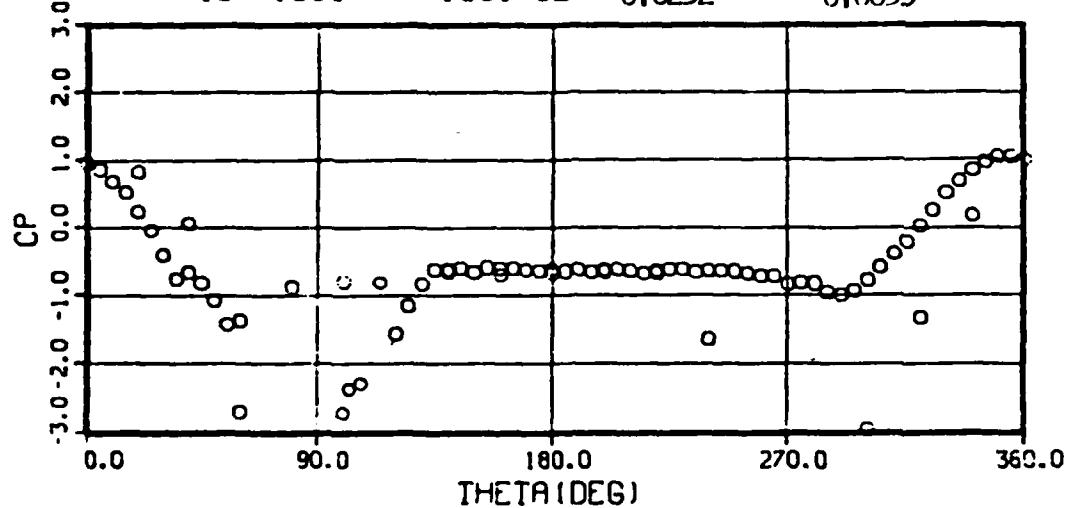
RUN 062 Q1U- 3.2 +/- .08 RND1U- .330 +/- .003  
PIU- 2096. +/- .00 VIU- 52.73 +/- .498  
MIU- .047 +/- .001 CL- 0.0366 CD- 1.0966



CP VALUES ALONG LONGITUDINAL RAYS AT  
POLAR ANGLE OF 4DEG-0 64DEG-+ 124DEG-X.  
THE 5 SETS OF POINTS AT EACH LOCATION  
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

SMOOTH CYLINDER

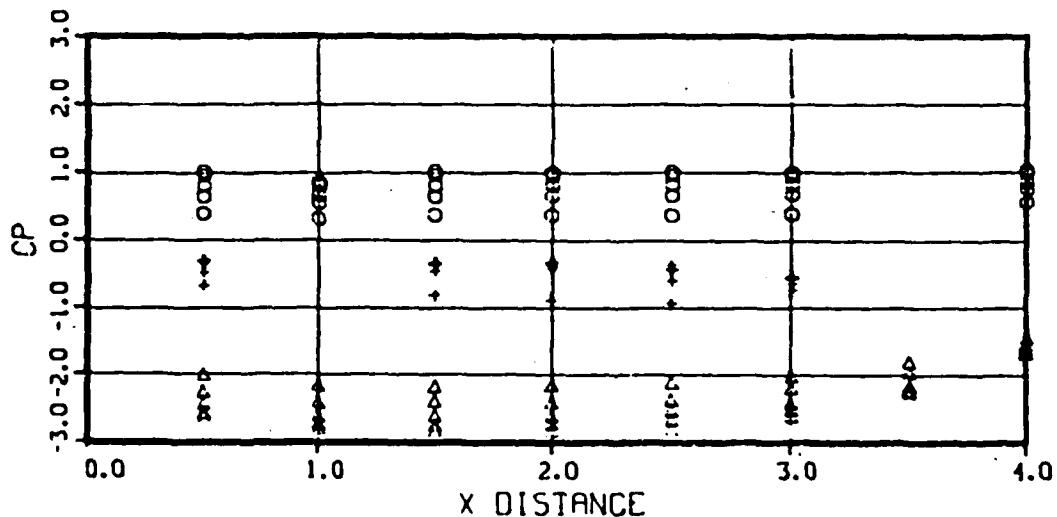
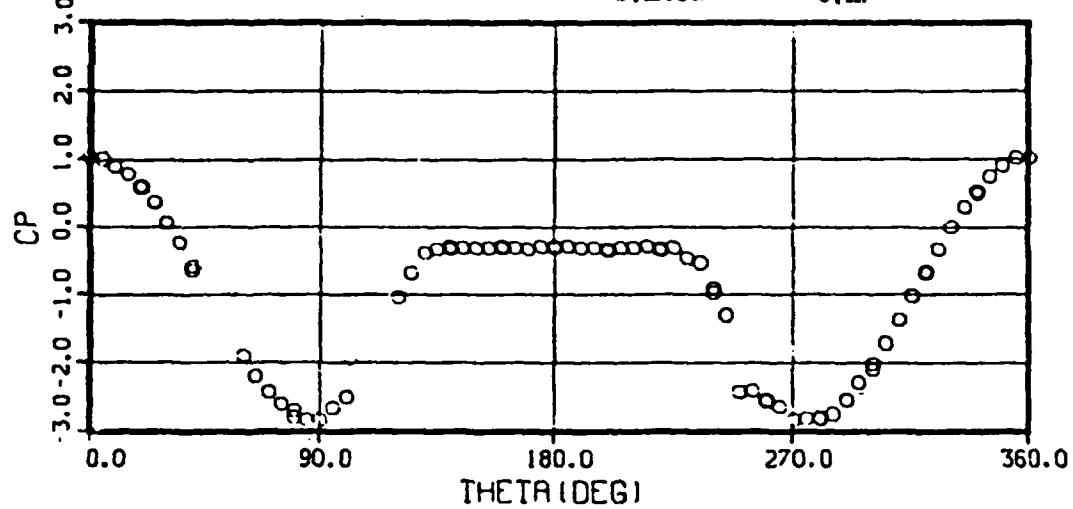
RUN 063 O1U- 4.1 +/- .08 RND1U- .371 +/- .002  
PIU- 2095. +/- .00 V1U- 59.25 +/- .450  
MIU- .053 +/- .001 CL- -0.8252 CD- 0.6053



CP VALUES ALONG LONGITUDINAL RAYS AT  
POLAR ANGLE OF 4DEG-0 64DEG-+ 124DEG-X.  
THE 5 SETS OF POINTS AT EACH LOCATION  
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

SMOOTH CYLINDER

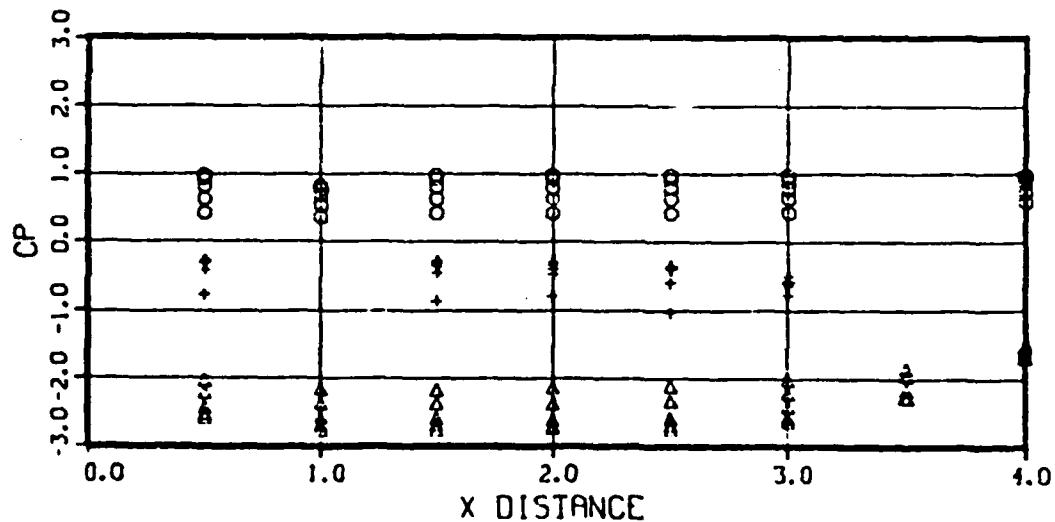
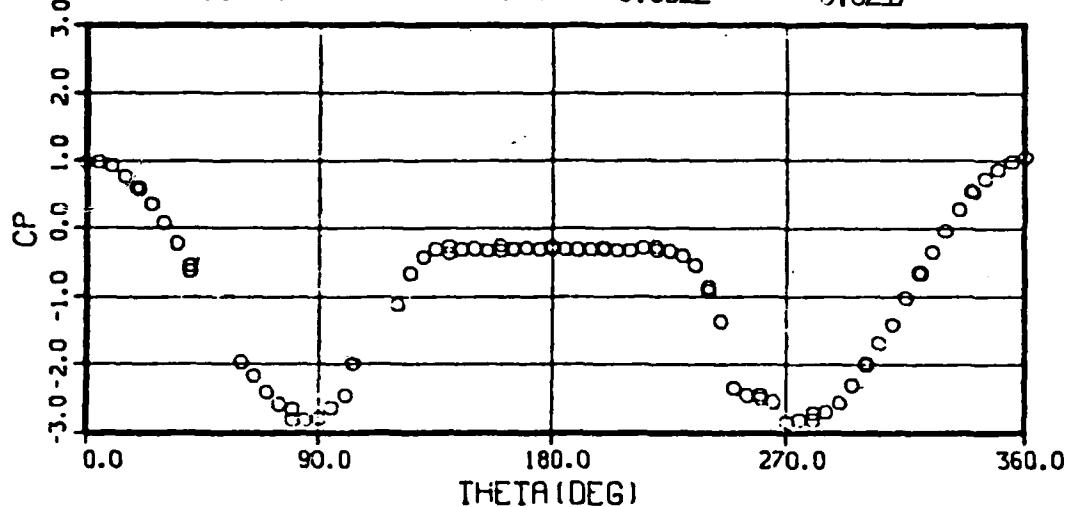
RUN 065 QIU- 4.5 +/- .00 RNDIU- .393 +/- .000  
PIU- 2095. +/- .00 VIU- 62.61 +/- .008  
M1U- .055 +/- .000 CL- 0.1099 CD- 0.27



CP VALUES ALONG LONGITUDINAL RAYS AT  
POLAR ANGLE OF 40DEG-0 64DEG-+ 124DEG-X.  
THE 5 SETS OF POINTS AT EACH LOCATION  
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

SMOOTH CYLINDER

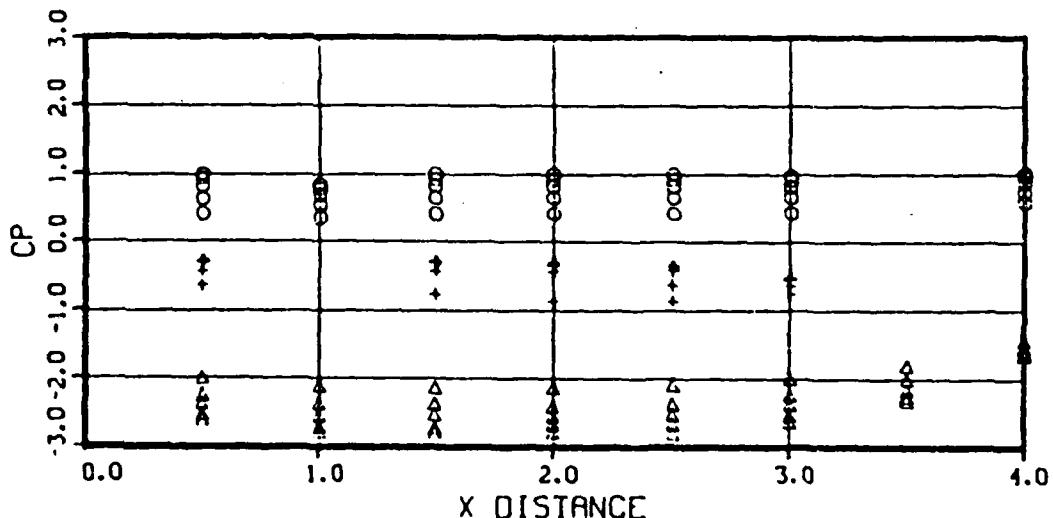
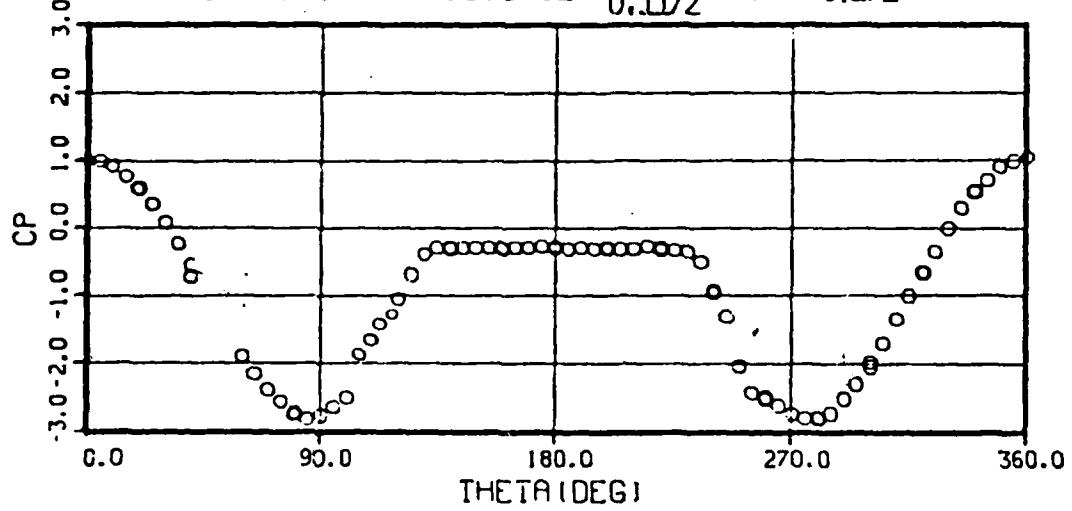
RUN 066 OIU- 4.7 +/- .00 RNDIU- .403 +/- .000  
PIU- 2095. +/- .00 VIU- 64.17 +/- .008  
MIU- .057 +/- .000 CL- 0.0912 CD- 0.0217



CP VALUES ALONG LONGITUDINAL RAYS AT  
POLAR ANGLE OF 4DEG-0 64DEG-- 124DEG-X.  
THE 5 SETS OF POINTS AT EACH LOCATION  
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

SMOOTH CYLINDER

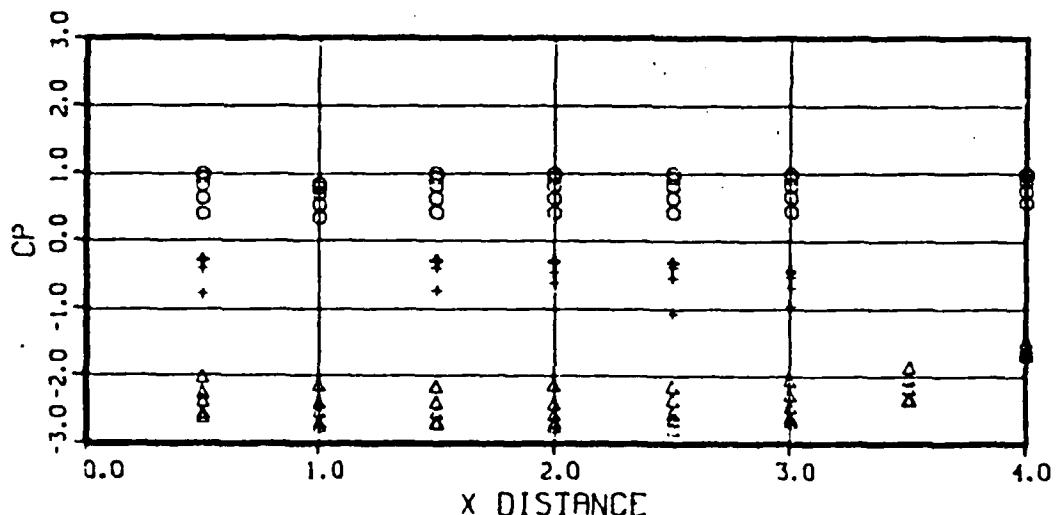
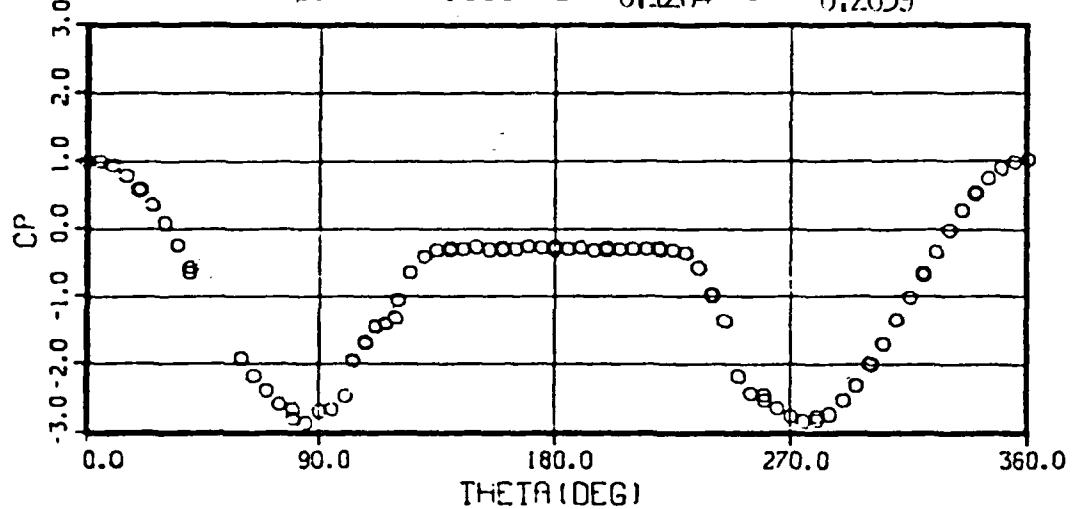
RUN 067 QIU- 4.8 +/- .00 RNDIU- .406 +/- .000  
PIU- 2095. +/- .00 VIU- 64.68 +/- .010  
MIU- .057 +/- .000 CL- 0.1172 CD- 0.272



CP VALUES ALONG LONGITUDINAL RAYS AT  
POLAR ANGLE OF 40DEG-0 64DEG--+ 124DEG-X.  
THE 5 SETS OF POINTS AT EACH LOCATION  
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

SMOOTH CYLINDER

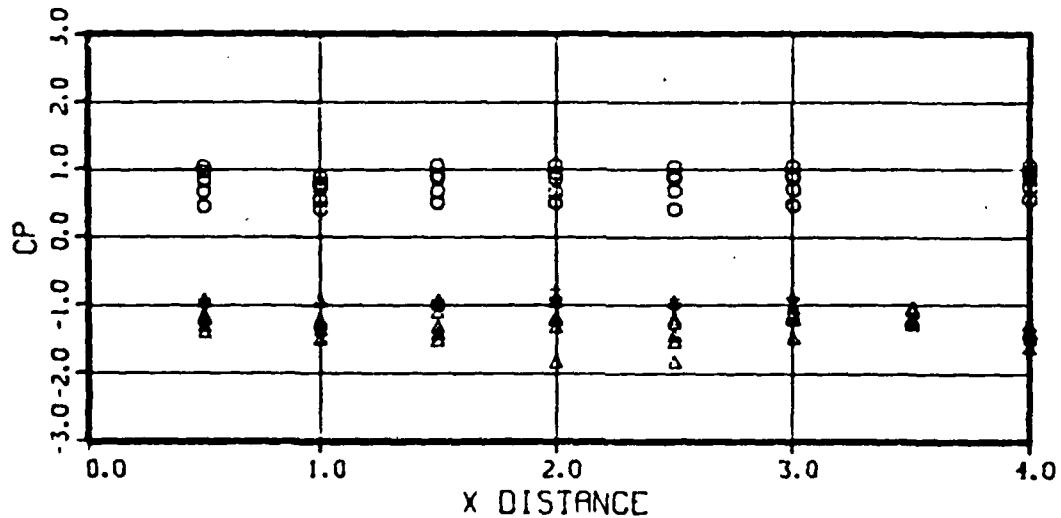
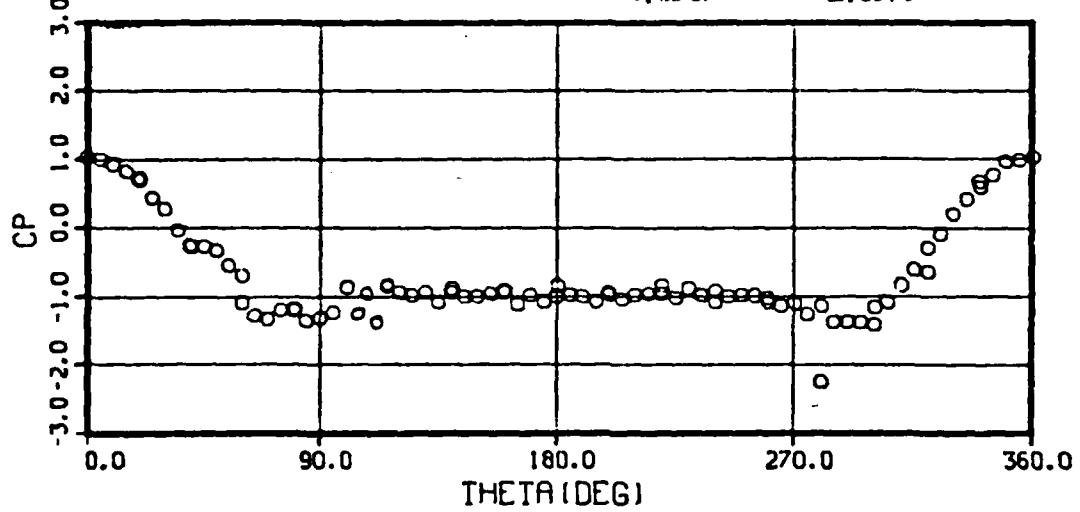
PUN 068 QIU- 5.3 +/- .00 RND1U- .425 +/- .000  
PIU- 2094. +/- .00 V1U- 67.68 +/- .000  
MIU- .060 +/- .000 CL- 0.1204 CD- 0.2659



CP VALUES ALONG LONGITUDINAL RAYS AT  
POLAR ANGLE OF 40DEG-0 64DEG-+ 124DEG-X.  
THE 5 SETS OF POINTS AT EACH LOCATION  
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

SMOOTH CYLINDER

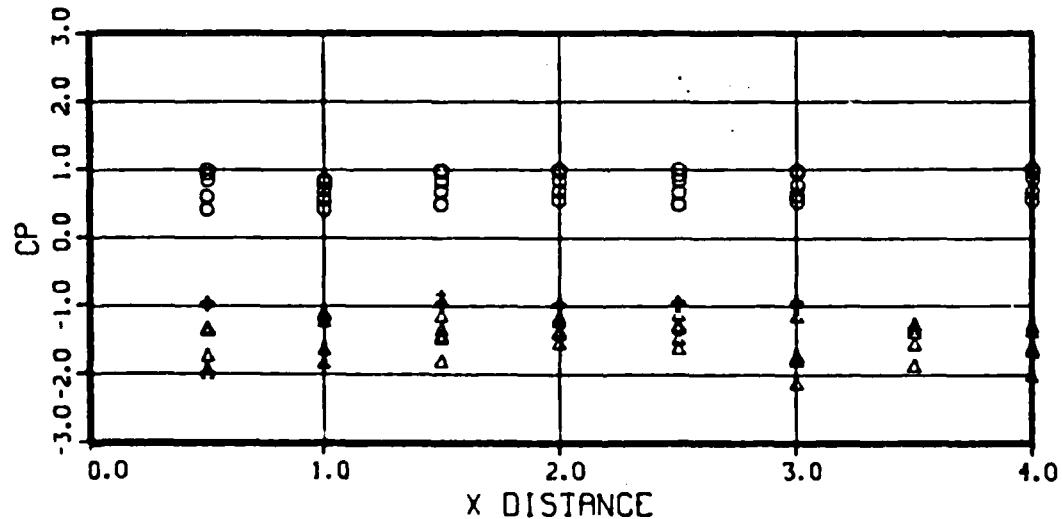
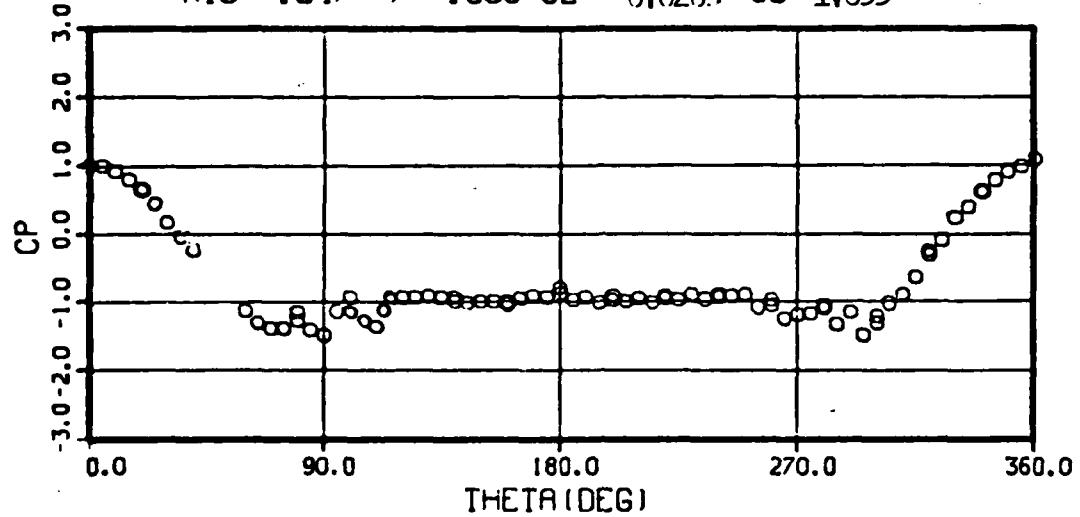
RUN 082 O1U- 3.2 +/- .24 RND1U- .333 +/- .010  
PIU- 2099. +/- .00 VIU- 52.34 +/- 1.488  
MIU- .046 +/- .002 CL- 0.0367 CD- 1.0575



CP VALUES ALONG LONGITUDINAL RAYS AT  
POLAR ANGLE OF 4DEG-0 64DEG-+ 124DEG-X.  
THE 5 SETS OF POINTS AT EACH LOCATION  
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

SMOOTH CYLINDER

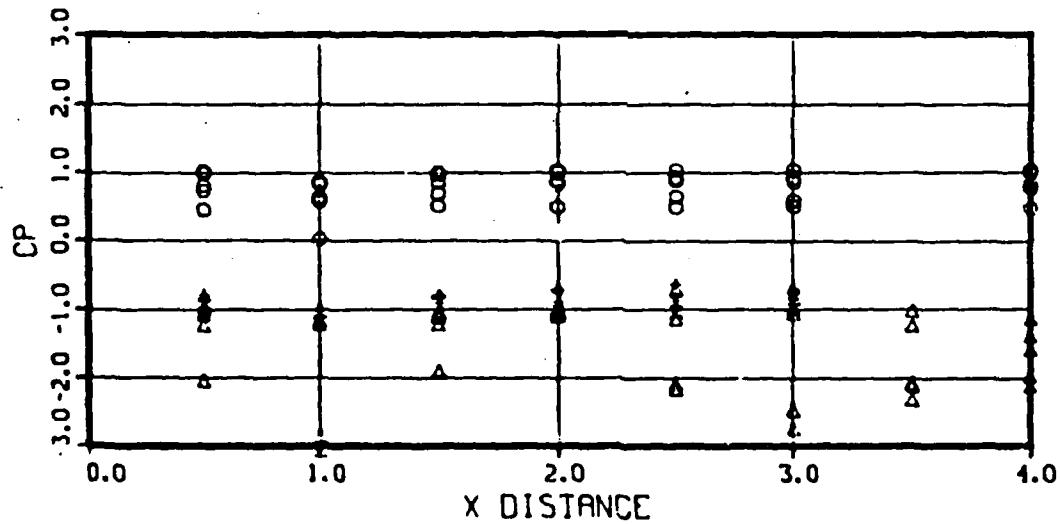
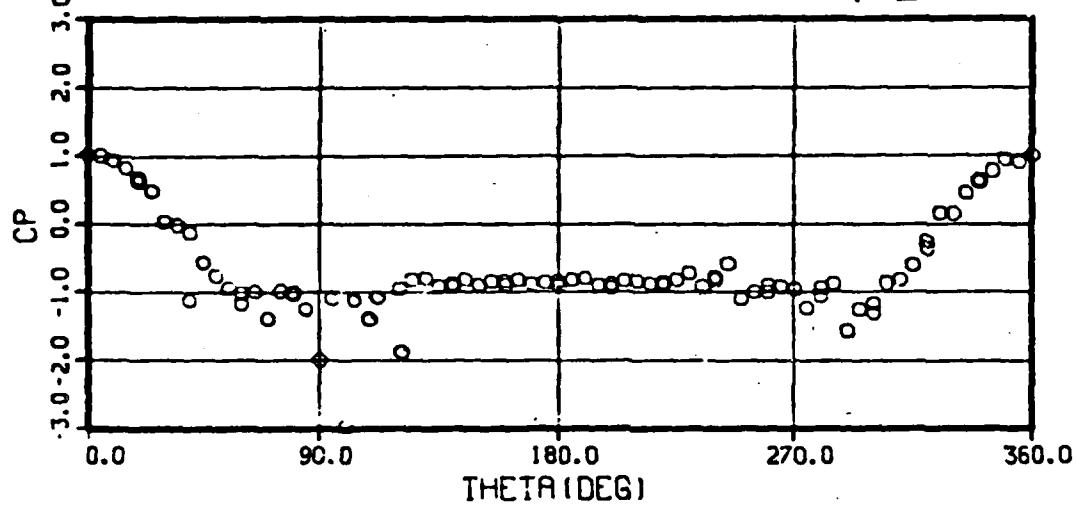
RUN 081 O1U- 3.3 +/- .08 RND1U- .338 +/- .003  
PIU- 2099. +/- .00 VIU- 53.11 +/- .506  
MIU- .047 +/- .000 CL- 0.0209 CD- 1.033



CP VALUES ALONG LONGITUDINAL RAYS AT  
POLAR ANGLE OF 4DEG-0 64DEG-+ 124DEG-X.  
THE 5 SETS OF POINTS AT EACH LOCATION  
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

SMOOTH CYLINDER

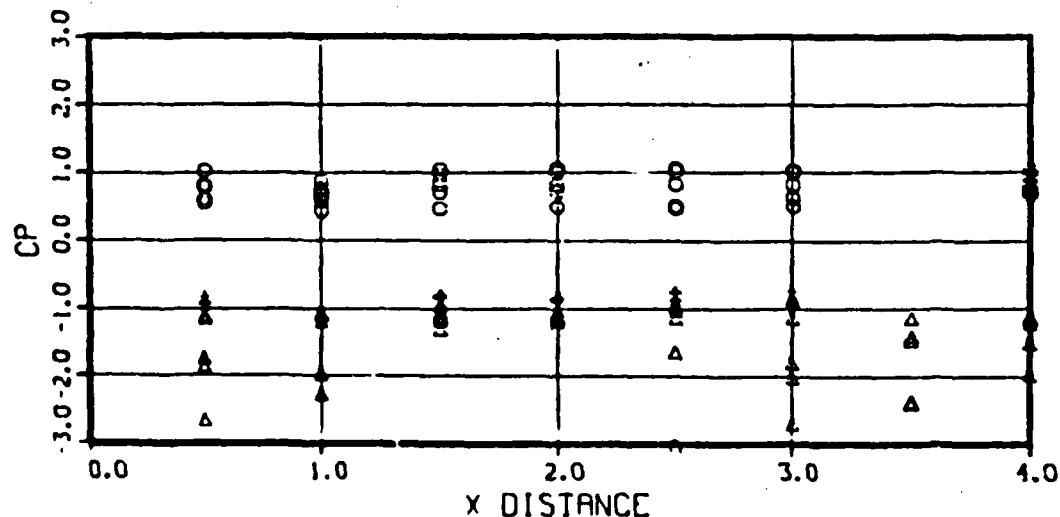
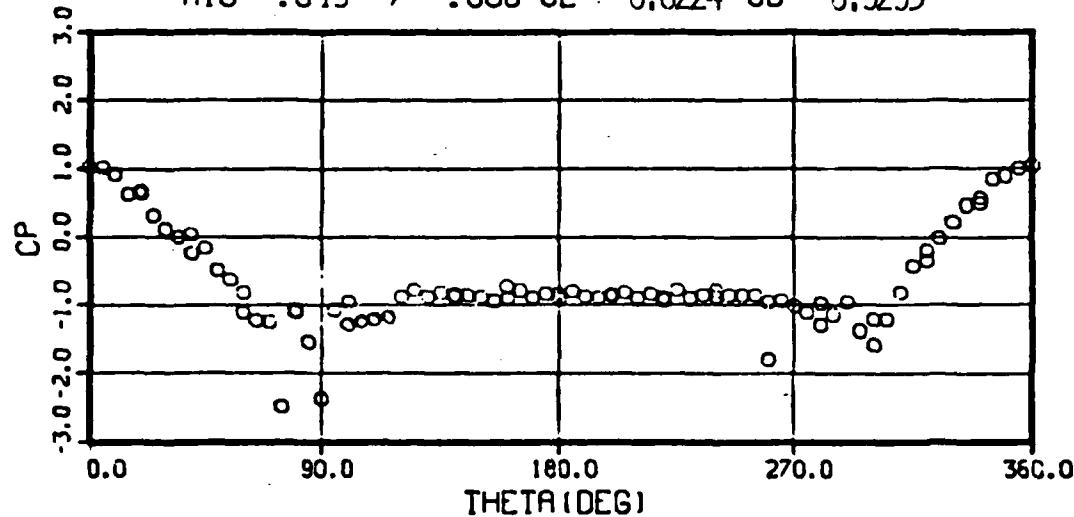
RUN 080 QIU- 3.5 +/- .00 RNDIU- .350 +/- .000  
PIU- 2099. +/- .80 VIU- 55.07 +/- .016  
MIU- .049 +/- .000 CL- - 0.1088 CD- 0.9513



CP VALUES ALONG LONGITUDINAL RAYS AT  
POLAR ANGLE OF 4DEG-0 64DEG-+ 124DEG-X.  
THE 5 SETS OF POINTS AT EACH LOCATION  
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

SMOOTH CYLINDER

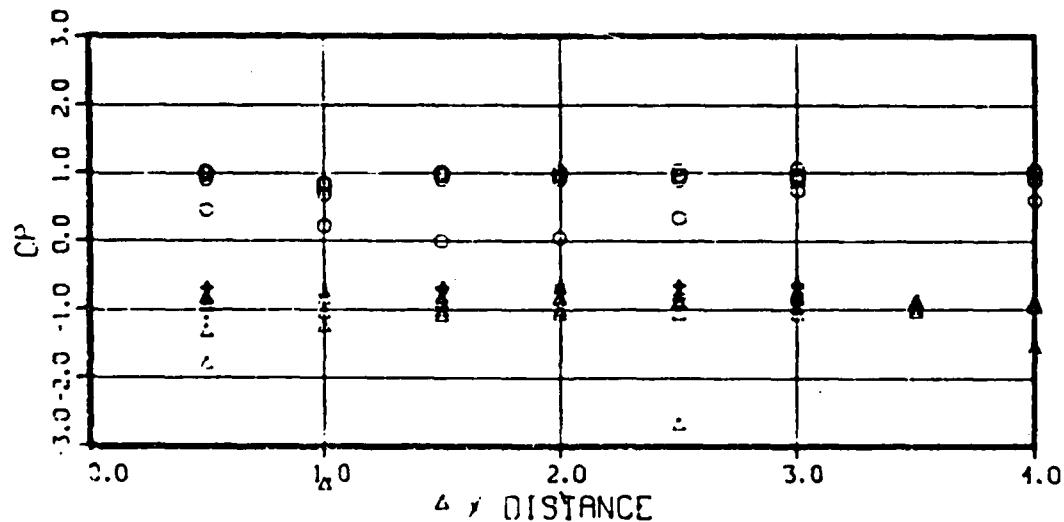
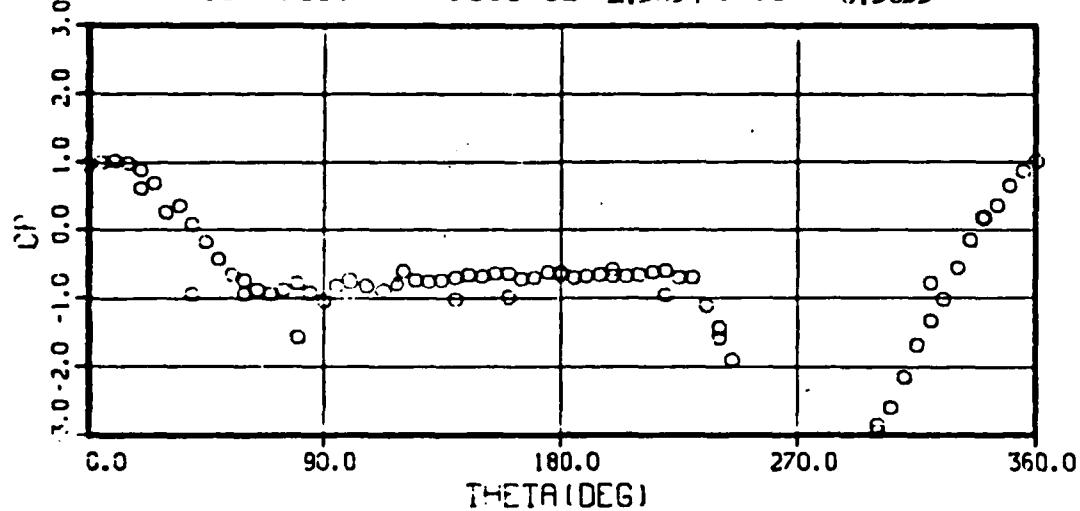
RUN 079 OIU- 3.5 +/- .00 PNDIU- .350 +/- .000  
PIU- 2098. +/- .00 VIU- 55.10 +/- .006  
MIU- .049 +/- .000 CL- -0.0224 CD- 0.9295



CP VALUES ALONG LONGITUDINAL RAYS AT  
POLAR ANGLE OF 4DEG-0 64DEG-+ 124DEG-X.  
THE 5 SETS OF POINTS AT EACH LOCATION  
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

SMOOTH CYLINDER

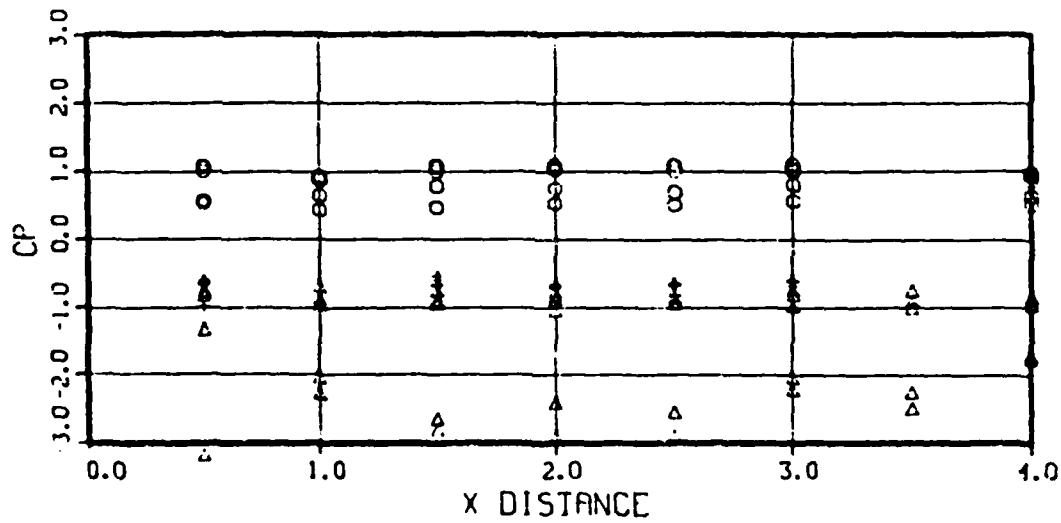
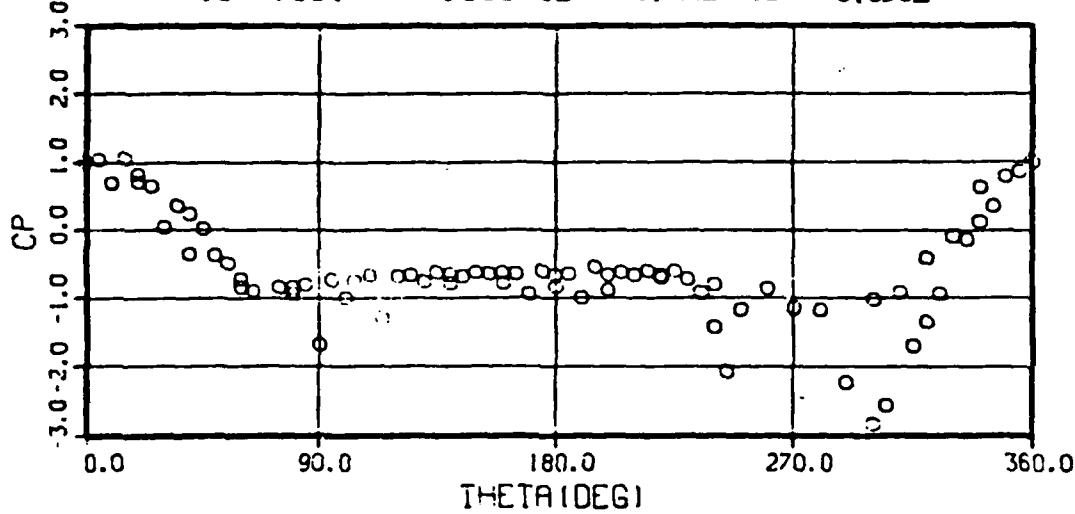
RUN 078 O1U- 3.8 +/- .08 RND1U- .364 +/- .003  
P1U- 2098. +/- .00 V1U- 57.34 +/- .458  
M1U- .051 +/- .000 CL- 1.3854 CD- 0.5633



CP VALUES ALONG LONGITUDINAL RAYS AT  
POLAR ANGLE OF ADEG-0 64DEG-- 124DEG-X.  
THE 5 SETS OF POINTS AT EACH LOCATION  
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

SMOOTH CYLINDER

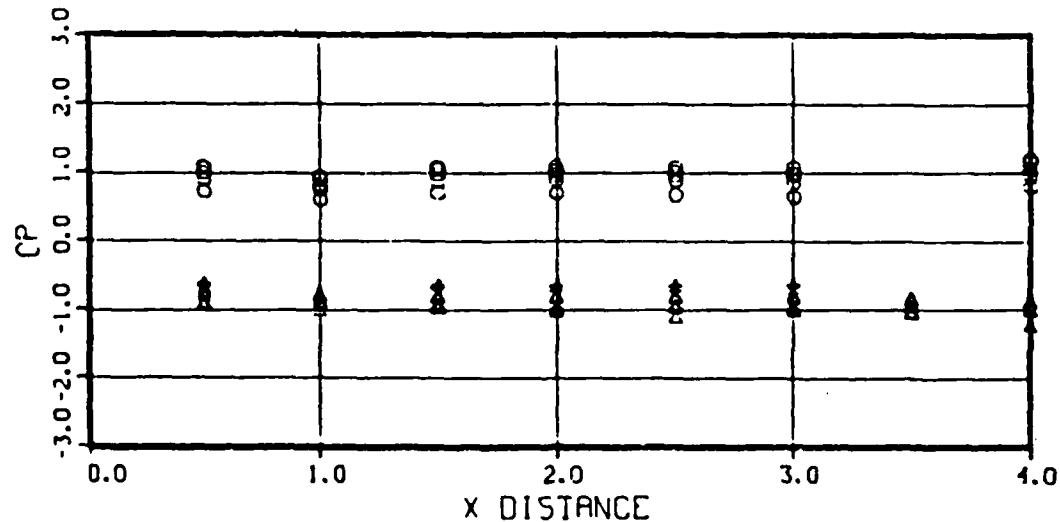
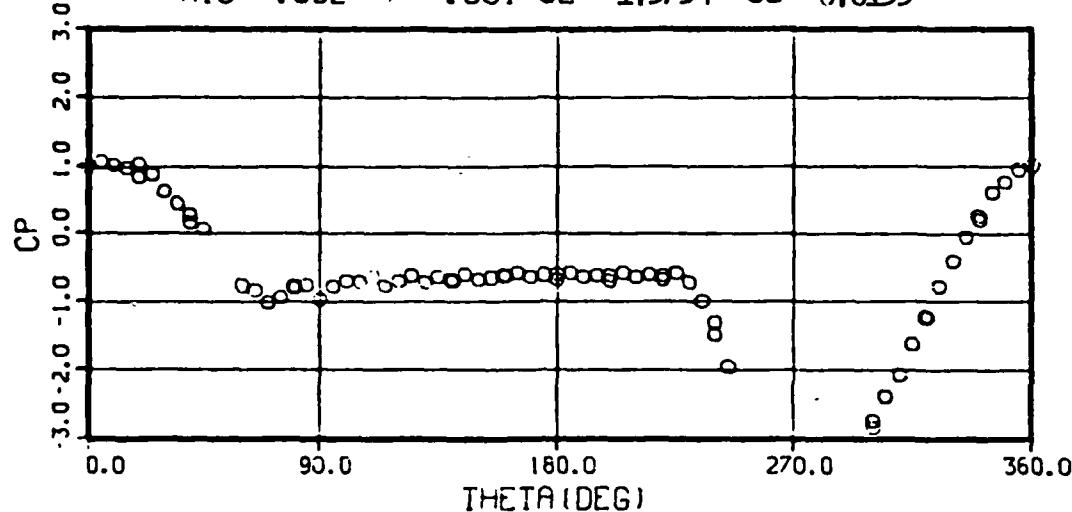
RUN 077 01U- 3.8 +/- .00 RNDIU- .364 +/- .000  
PIU- 2098. +/- .00 VIU- 57.46 +/- .006  
MIU- .051 +/- .000 CL- 0.9313 CD- 0.6381



CP VALUES ALONG LONGITUDINAL RAYS AT  
POLAR ANGLE OF 4DEG-0 64DEG-+ 124DEG-X.  
THE 5 SETS OF POINTS AT EACH LOCATION  
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

SMOOTH CYLINDER

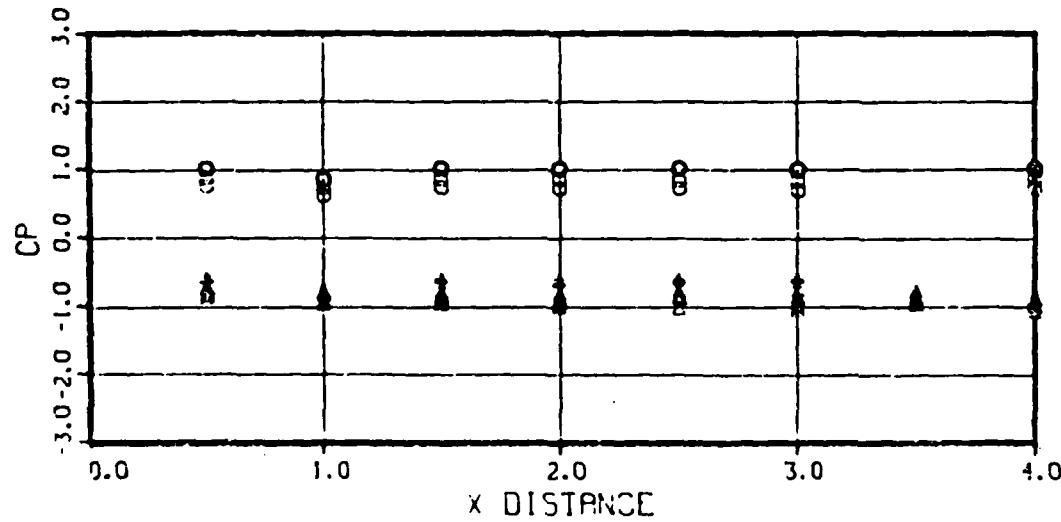
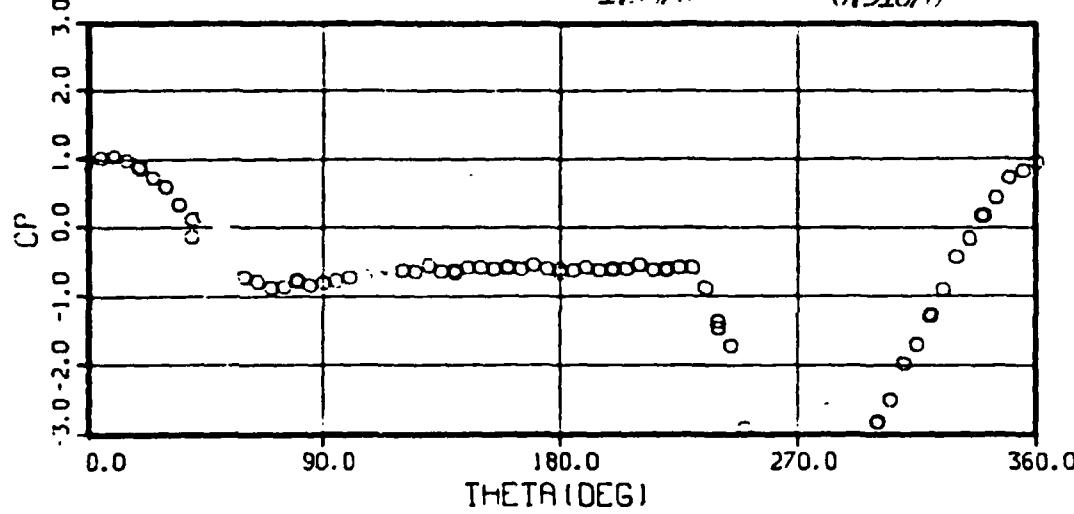
RUN 076 O1U- 4.0 +/- .08 RND1U- .372 +/- .003  
 PIU- 2098. +/- .00 V1U- 58.73 +/- .450  
 MIU- .052 +/- .001 CL- 1.5734 CD- 0.6135



CP VALUES ALONG LONGITUDINAL RAYS AT  
 POLAR ANGLE OF .40DEG-0 64DEG-+ 124DEG-X.  
 THE 5 SETS OF POINTS AT EACH LOCATION  
 CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

SMOOTH CYLINDER

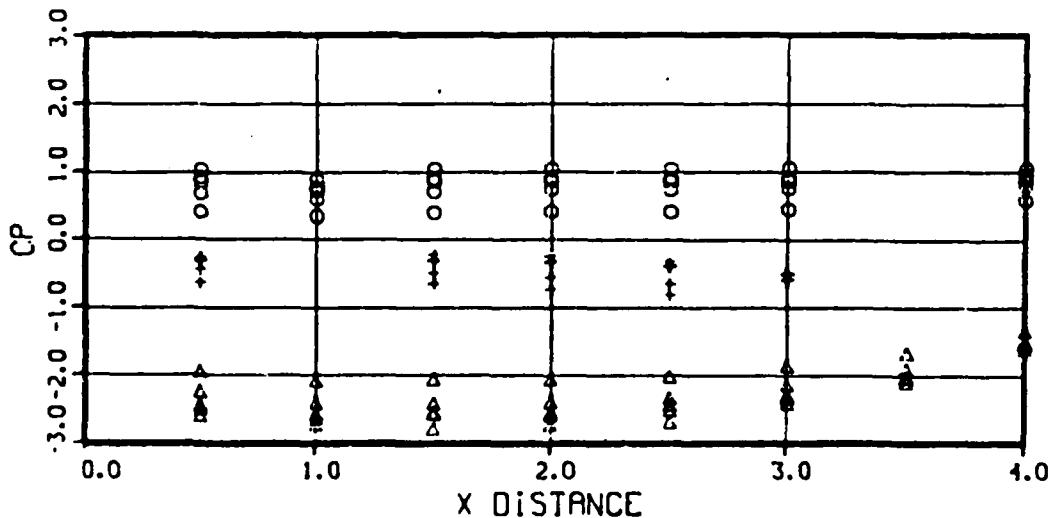
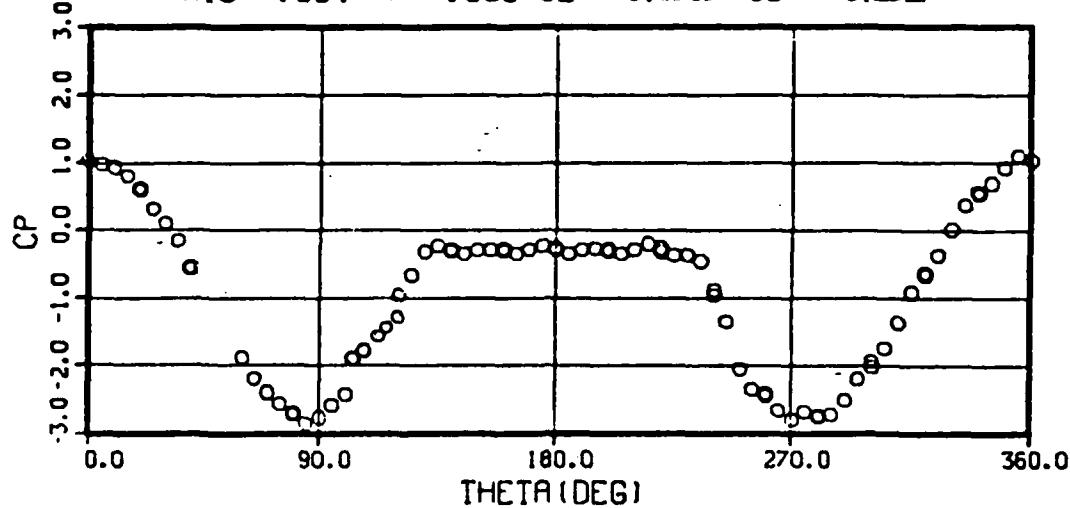
RUN 075 OIU- 4.1 +/- .00 RNDIU- .35 +/- .003  
PIU- 2098. +/- .00 VIU- 59.19 +/- .008  
M1U- .053 +/- .000 CL-1.5478 CD- 0.51670



CP VALUES ALONG LONGITUDINAL RAYS AT  
POLAR ANGLE OF 4DEG-0 64DEG-+ 124DEG-X.  
THE 5 SETS OF POINTS AT EACH LOCATION  
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

SMOOTH CYLINDER

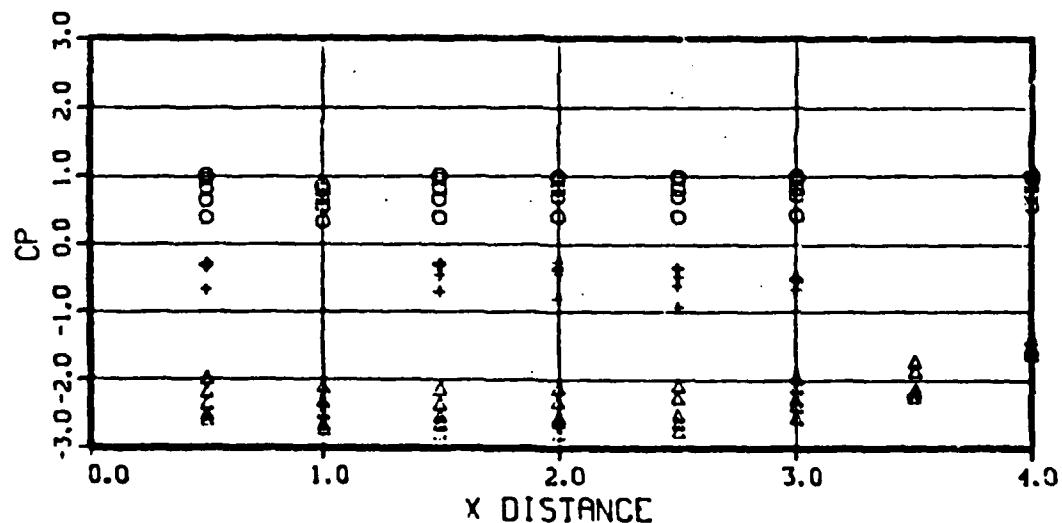
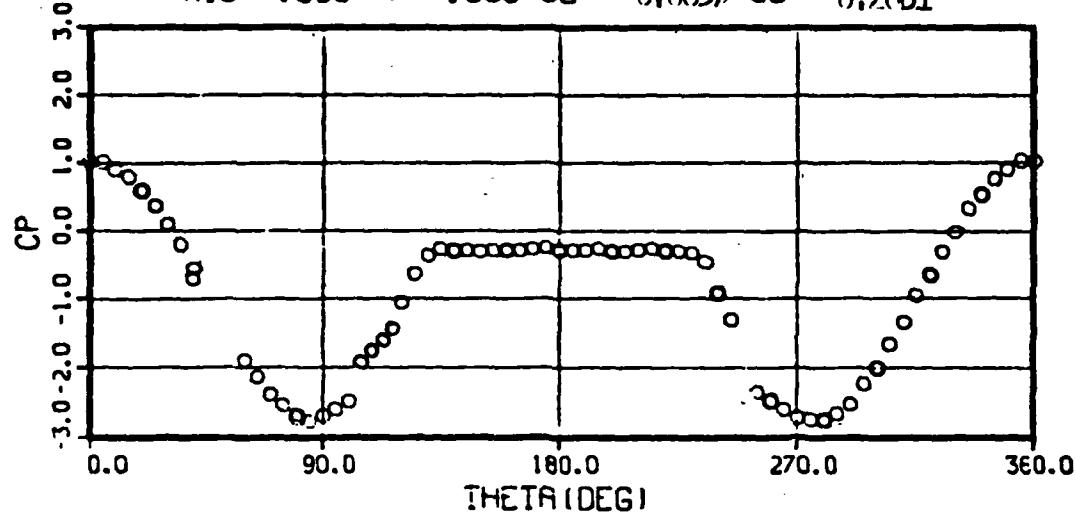
RUN 074 01U- 4.3 +/- .00 RND1U- .385 +/- .000  
P1U- 2097. +/- .00 V1U- 60.87 +/- .008  
MIU- .054 +/- .000 CL- 0.0563 CD- 0.2517



CP VALUES ALONG LONGITUDINAL RAYS AT  
POLAR ANGLE OF 40DEG-0 64DEG-+ 124DEG-X.  
THE 5 SETS OF POINTS AT EACH LOCATION  
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

SMOOTH CYLINDER

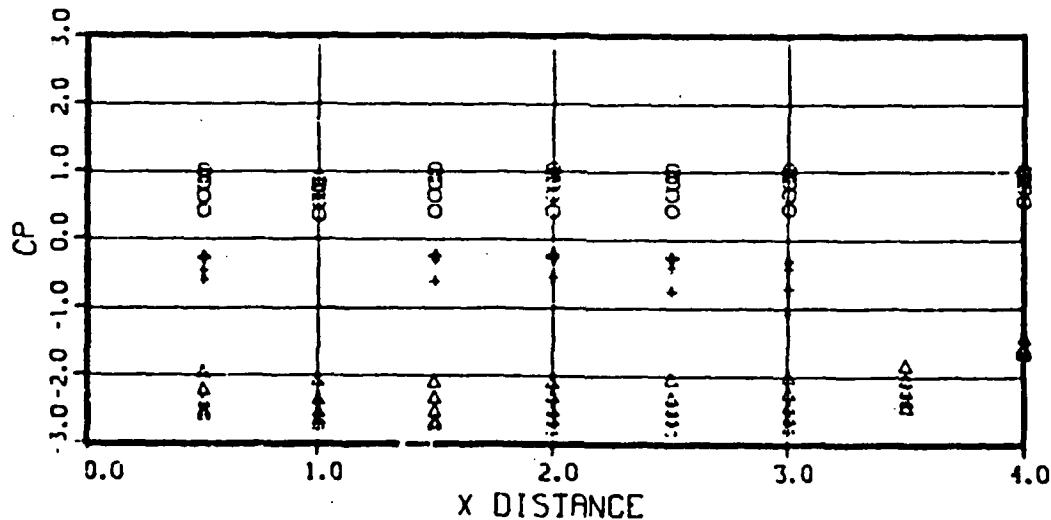
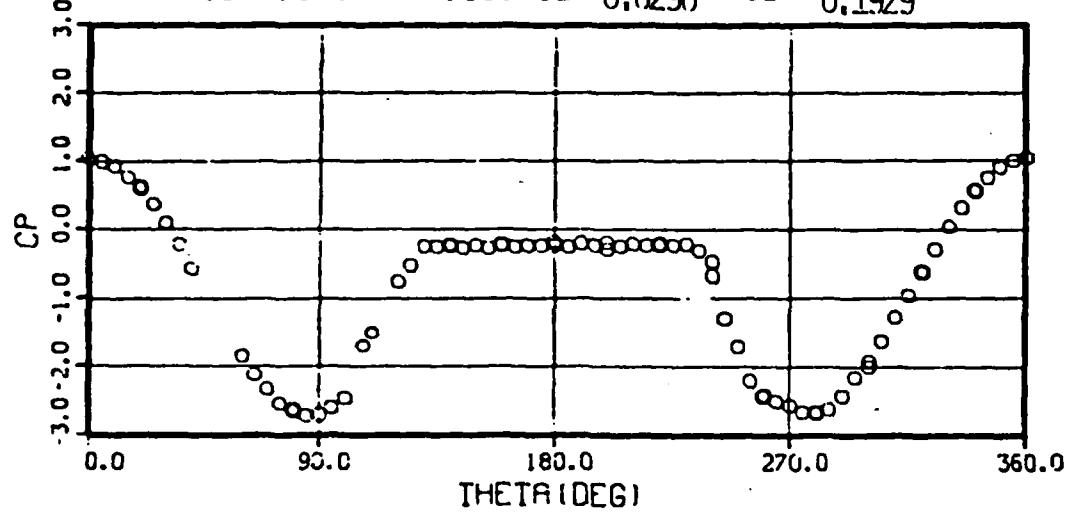
RUN 073 01U- 4.5 +/- .00 RND1U- .395 +/- .001  
PIU- 2096. +/- .00 V1U- 62.50 +/- .010  
M1U- .055 +/- .000 CL- 0.0837 CD- 0.2661



CP VALUES ALONG LONGITUDINAL RAYS AT  
POLAR ANGLE OF 4DEG-0 64DEG-- 124DEG-X.  
THE 5 SETS OF POINTS AT EACH LOCATION  
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

SMOOTH CYLINDER

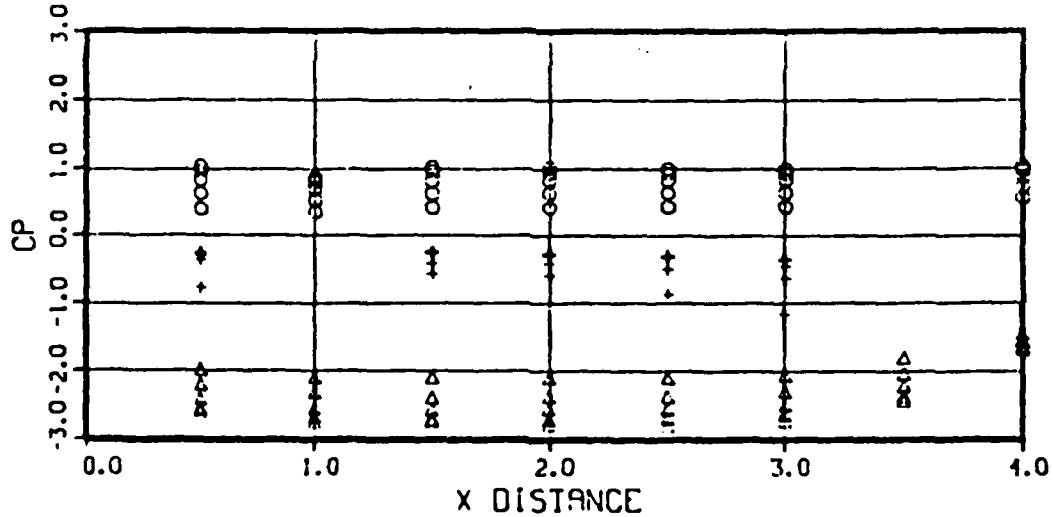
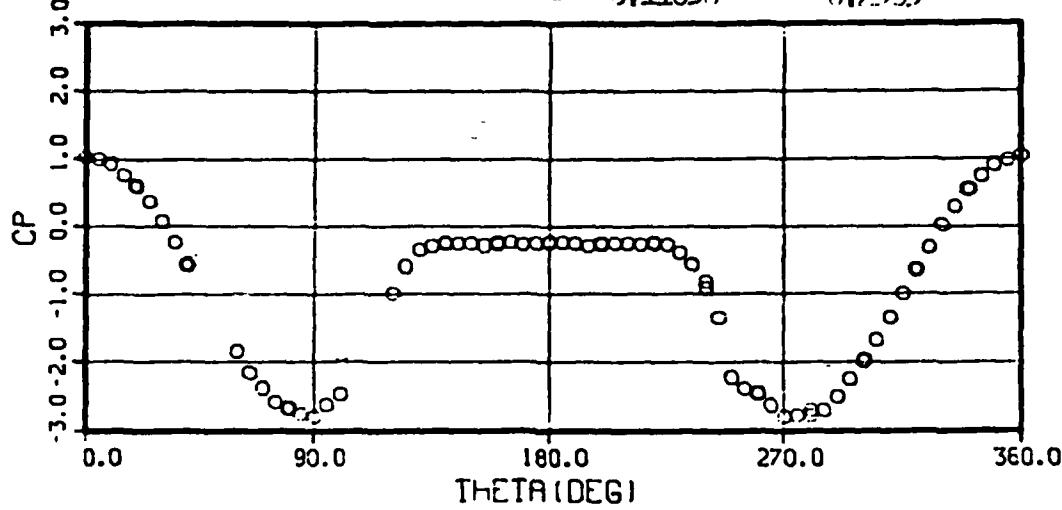
RUN 072 QIU- 8.5 +/- .06 RNDIU- .539 +/- .001  
PIU- 2092. +/- .00 VIU- 85.62 +/- .248  
MIU- .076 +/- .000 CL- 0.0290 CD- 0.1929



CP VALUES ALONG LONGITUDINAL RAYS AT  
POLAR ANGLE OF 4DEG-0 64DEG-+ 124DEG-X.  
THE 5 SETS OF POINTS AT EACH LOCATION  
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

SMOOTH CYLINDER

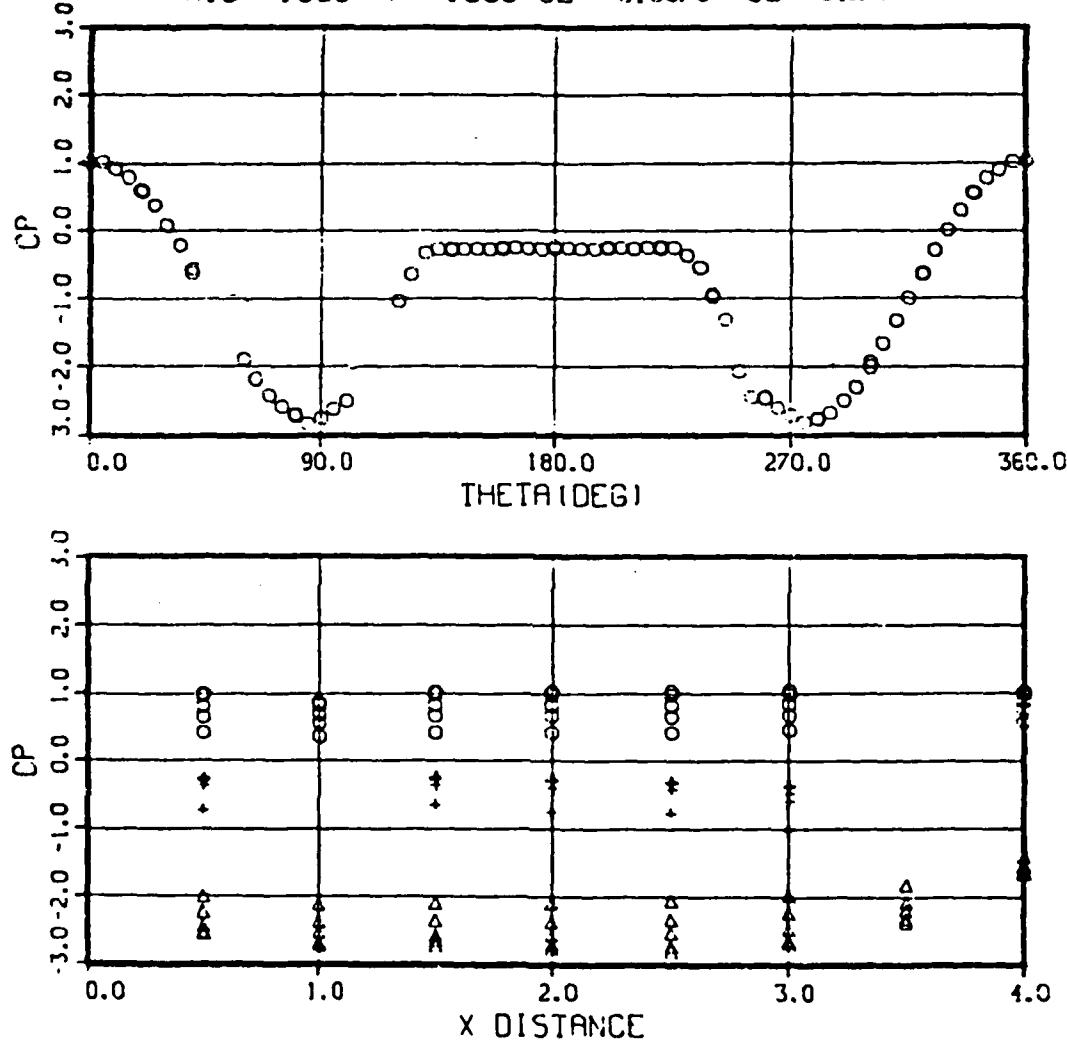
RUN 071 C1U- 6.6 +/- .00 RND1U- .478 +/- .000  
PIU- 2093. +/- .00 V1U- 75.94 +/- .006  
MIU- .067 +/- .000 CL- 0.11030 CD- 0.2385



CP VALUES ALONG LONGITUDINAL RAYS AT  
POLAR ANGLE OF 4DEG-0 64DEG-+ 124DEG-X.  
THE 5 SETS OF POINTS AT EACH LOCATION  
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

SMOOTH CYLINDER

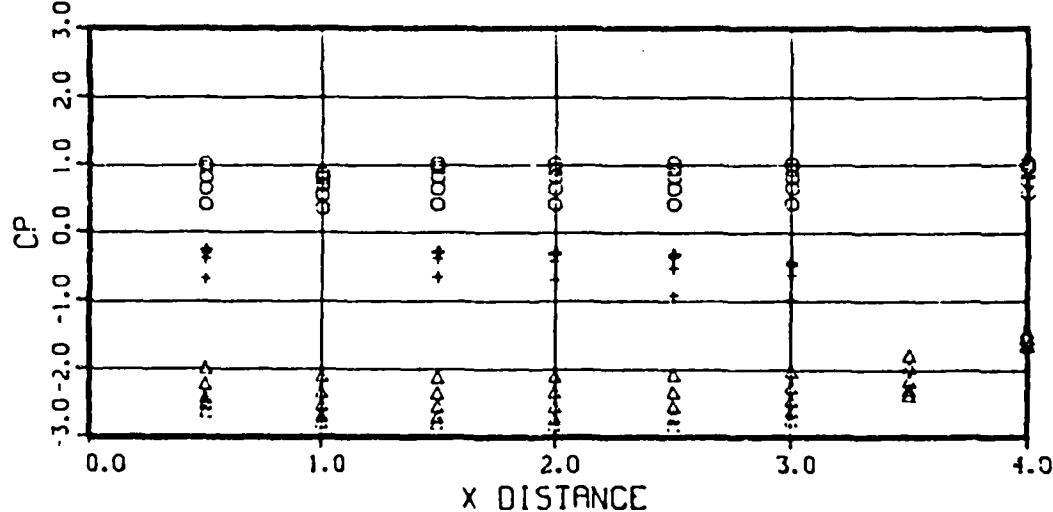
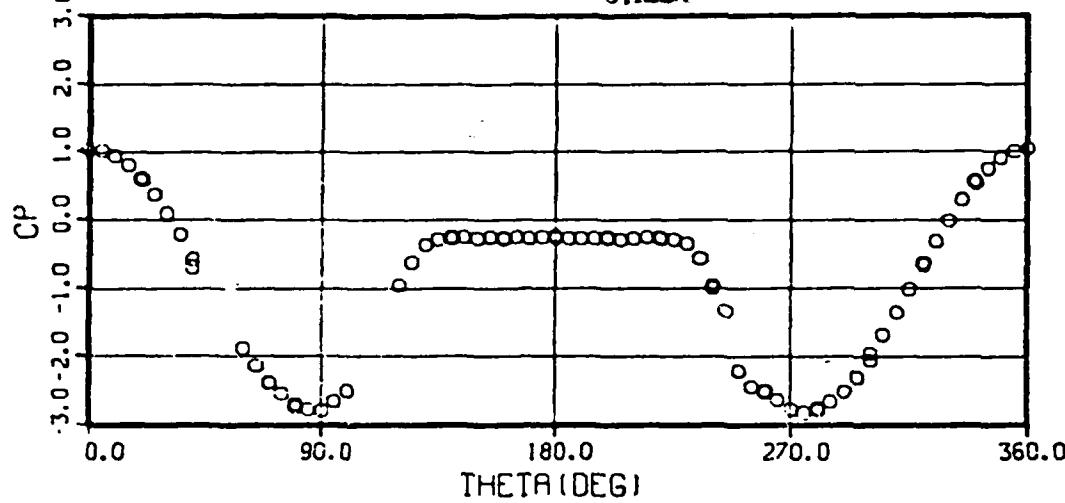
RUN 070 QIU- 5.8 +/- .00 RNDIU- .447 +/- .000  
PIU- 2094. +/- .00 VIU- 70.99 +/- .008  
MIU- .063 +/- .000 CL- 0.0876 CD- 0.2476



CP VALUES ALONG LONGITUDINAL RAYS AT  
POLAR ANGLE OF 4DEG-0 64DEG--+ 124DEG-X.  
THE 5 SETS OF POINTS AT EACH LOCATION  
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

SMOOTH CYLINDER

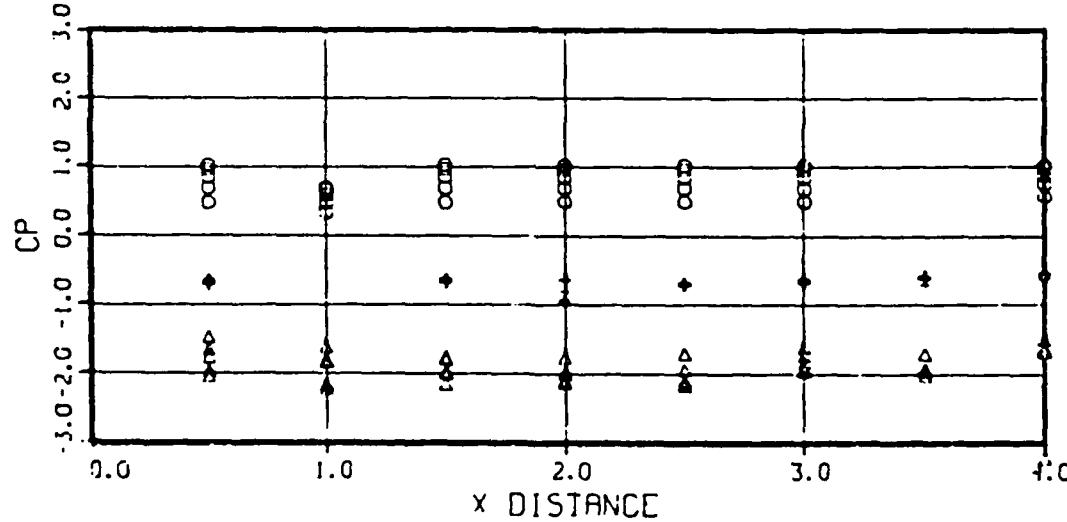
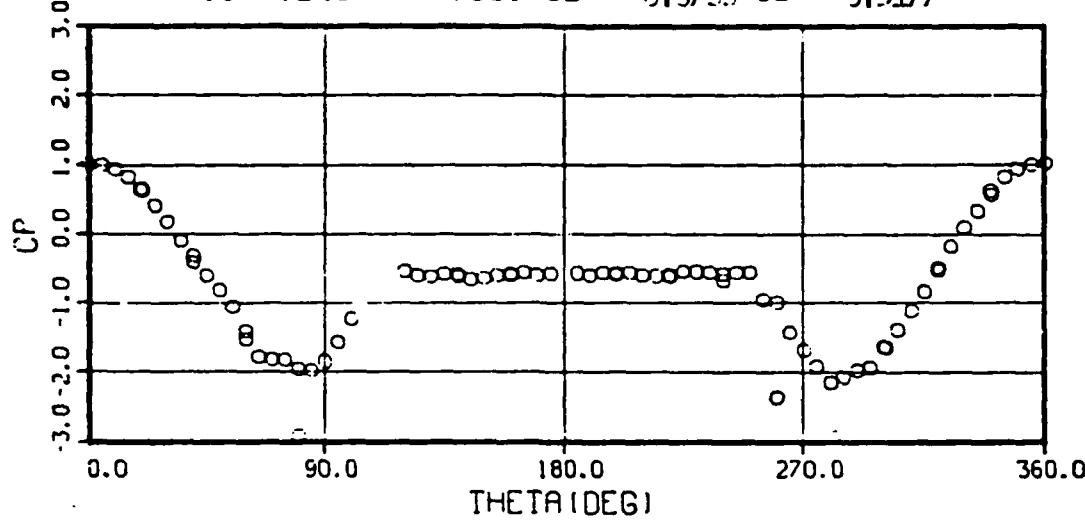
RUN 069 OIU- 5.4 +/- .00 RNDIU- .432 +/- .000  
PIU- 2094. +/- .80 VIU- 68.64 +/- .016  
MIU- .061 +/- .000 CL- 0.1159 CD- 0.2501



CP VALUES ALONG LONGITUDINAL RAYS AT  
POLAR ANGLE OF 40DEG-0 64DEG-+ 124DEG-X.  
THE 5 SETS OF POINTS AT EACH LOCATION  
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

SMOOTH CYLINDER

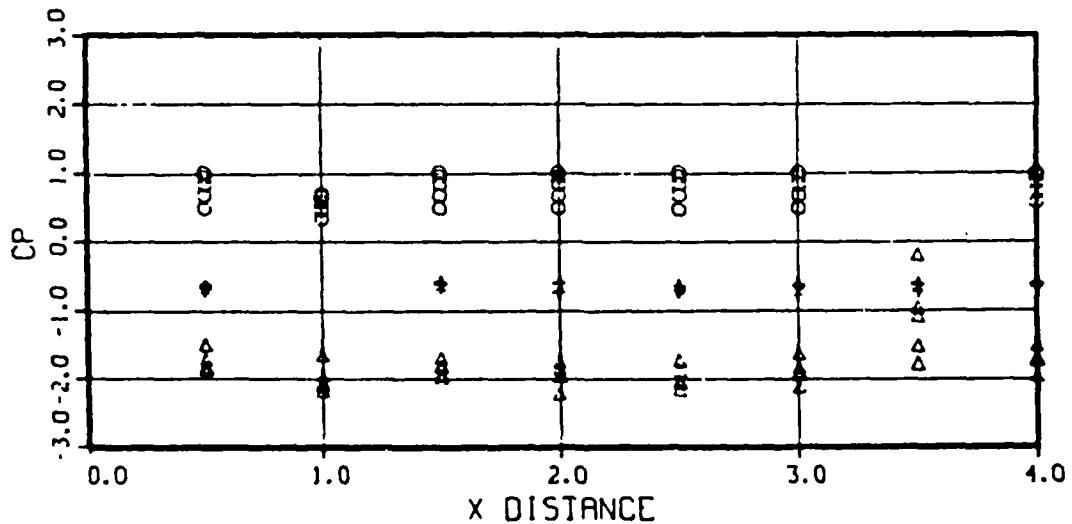
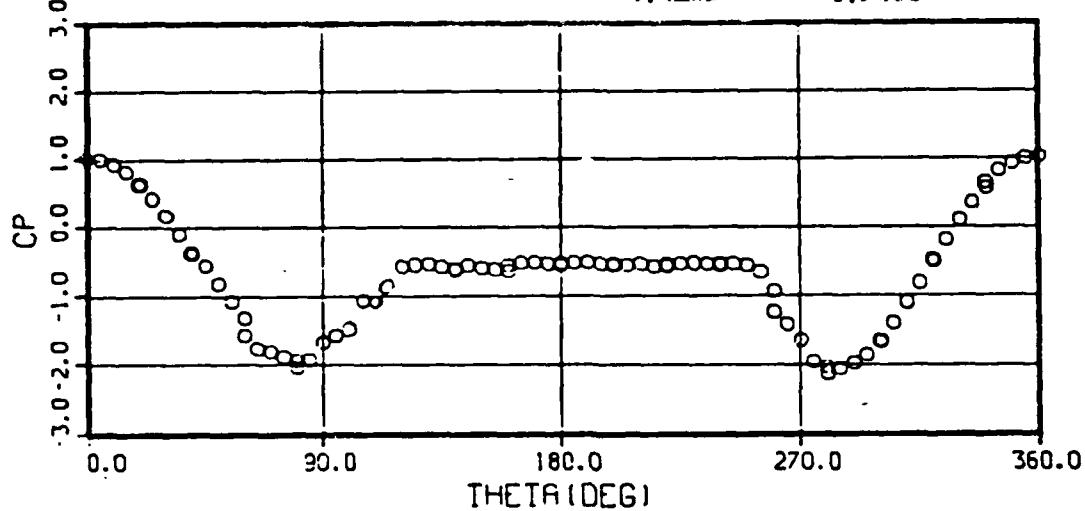
RUN 091 OIU-431.4 +/- 2.10 RNDIU-8.063 +/- .005  
PIU-10030. +/- 3.20 VIU-284.56 +/- .936  
MIU- .248 +/- .001 CL- -0.0799 CD- 0.5177



CP VALUES ALONG LONGITUDINAL RAYS AT  
POLAR ANGLE OF 4DEG-0 64DEG-+ 124DEG-X.  
THE 5 SETS OF POINTS AT EACH LOCATION  
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

SMOOTH CYLINDER

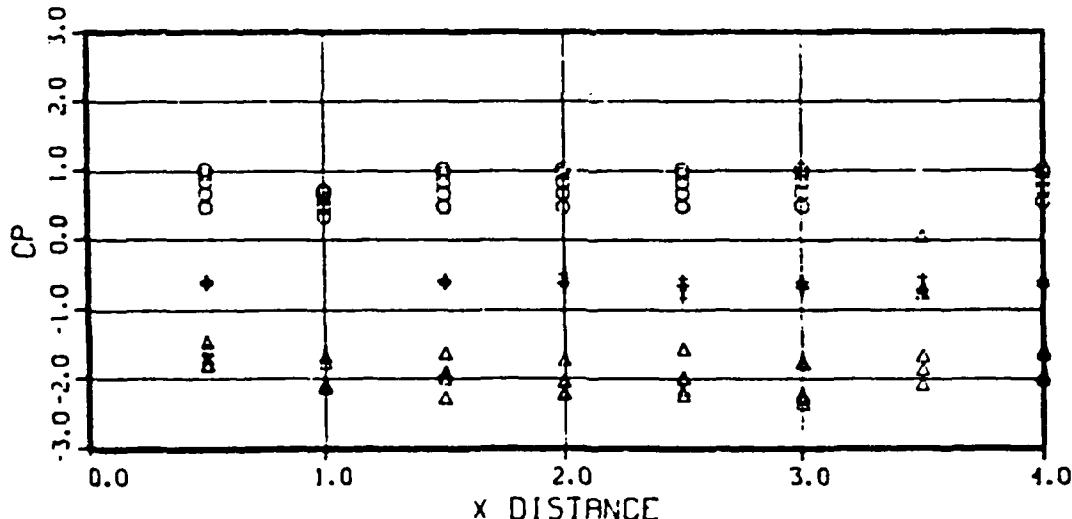
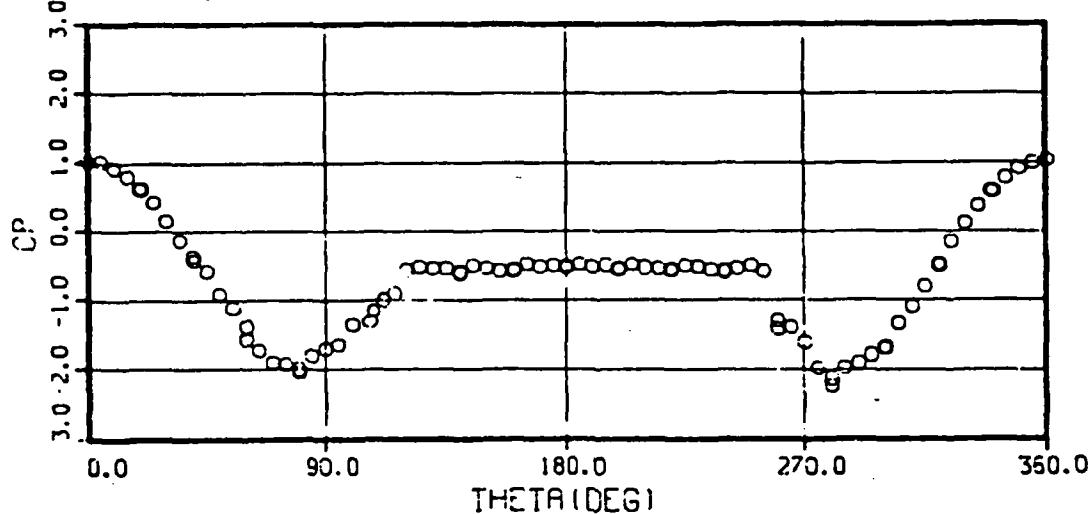
RUN 092 01U-382.5 +/- 2.48 RND1U-7.146 +/- .019  
P1U- 8899. +/- 8.00 V1U-284.55 +/- 1.066  
M1U- .248 +/- .001 CL- -0.0105 CD- 0.5068



CP VALUES ALONG LONGITUDINAL RAYS AT  
POLAR ANGLE OF 4DEG-0 64DEG-+ 124DEG-X.  
THE 5 SETS OF POINTS AT EACH LOCATION  
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

SMOOTH CYLINDER

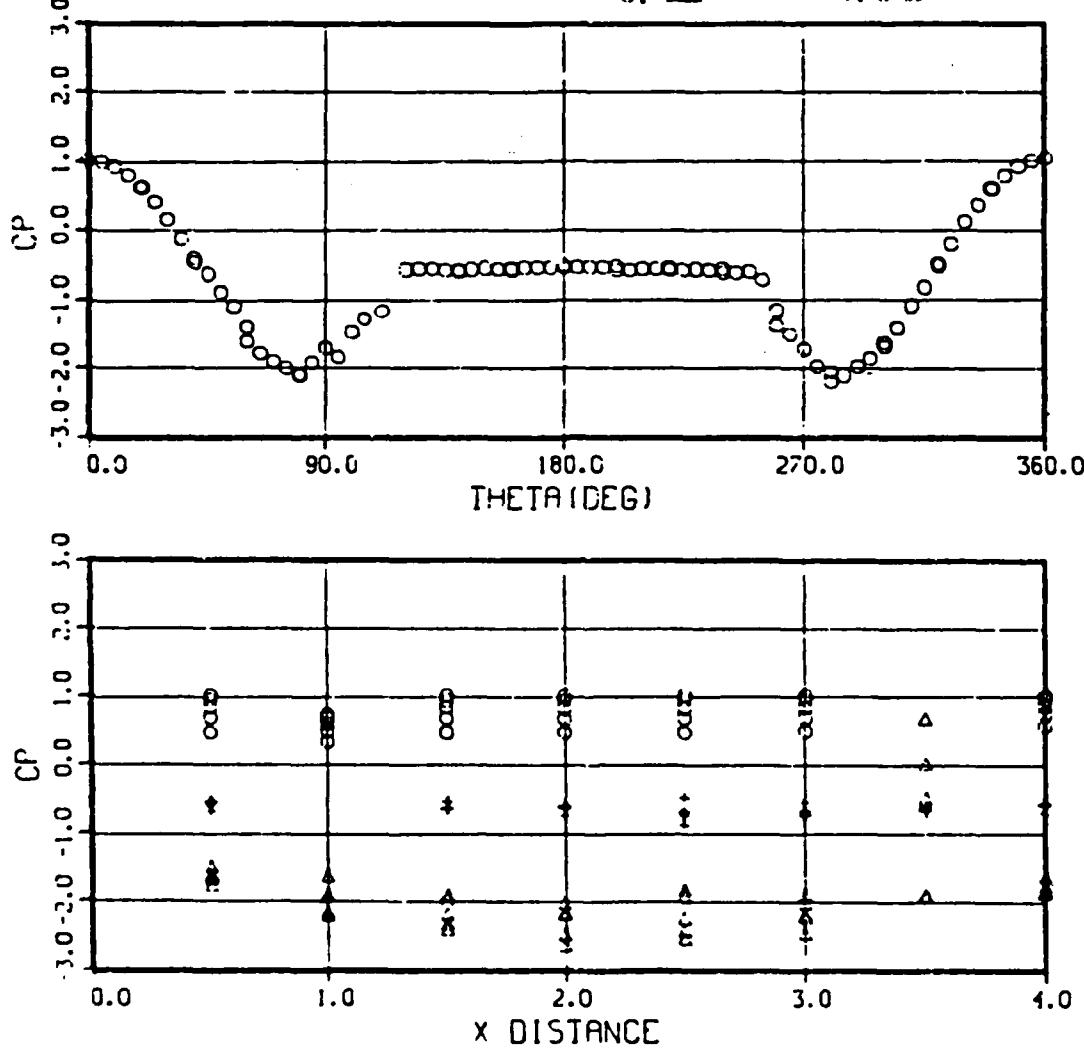
RUN 093 01U-329.2 +/- 1.68 RND1U-6.128 +/- .018  
PIU- 7684. +/- 2.00 VIU-284.67 +/- .800  
MIU- .247 +/- .001 CL- -0.0220 CD- 0.4715



CP VALUES ALONG LONGITUDINAL RAYS AT  
POLAR ANGLE OF 40DEG-0 64DEG-- 124DEG-X.  
THE 5 SETS OF POINTS AT EACH LOCATION  
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

SMOOTH CYLINDER

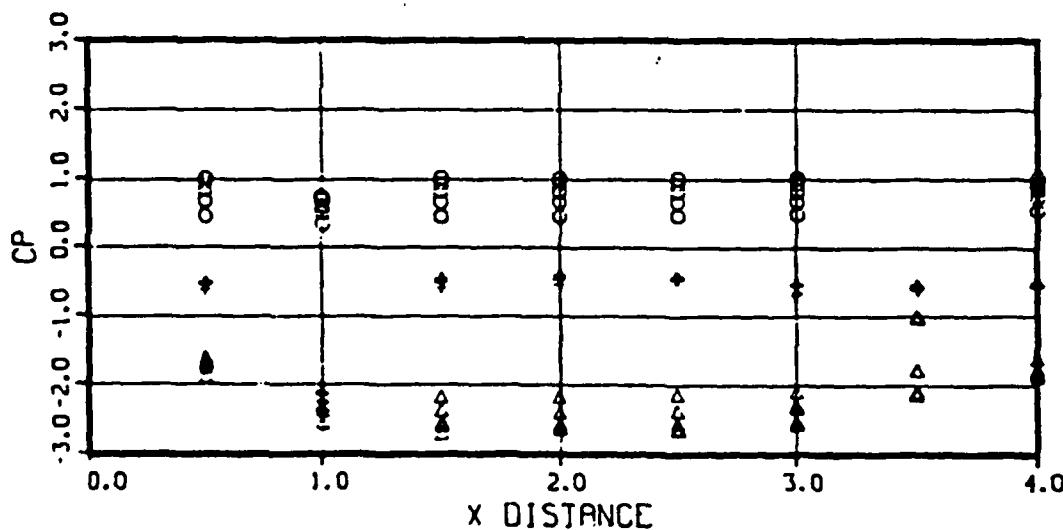
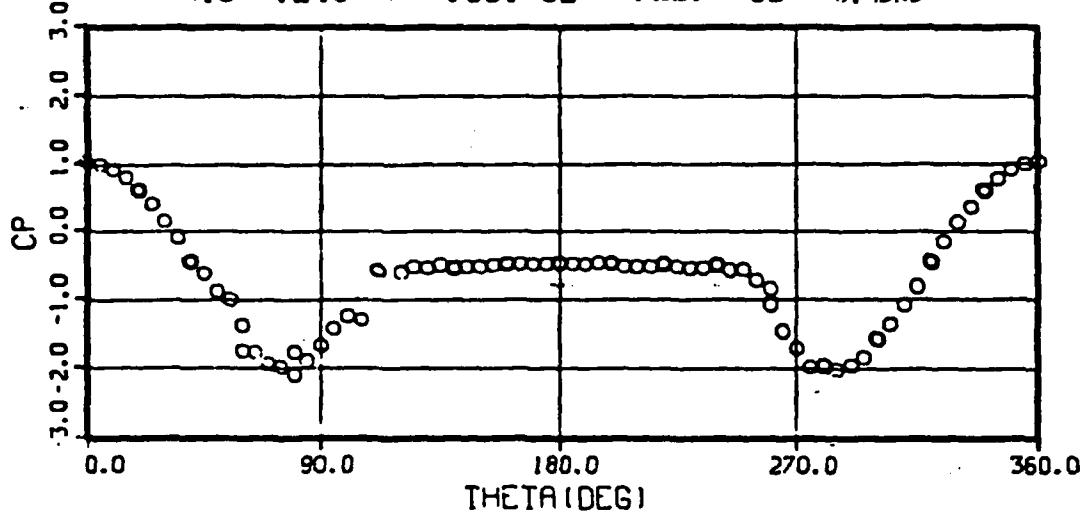
RUN 094 01U-272.1 +/- 1.58 RND1U-5.098 +/- .021  
 PIU- 6364. +/- 6.60 VIU-283.79 +/- .728  
 MIU- .247 +/- .001 CL--0.01170 CD- 0.4705



CP VALUES ALONG LONGITUDINAL RAYS AT  
 POLAR ANGLE OF 40DEG-0 64DEG-+ 124DEG-X.  
 THE 5 SETS OF POINTS AT EACH LOCATION  
 CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

SMOOTH CYLINDER

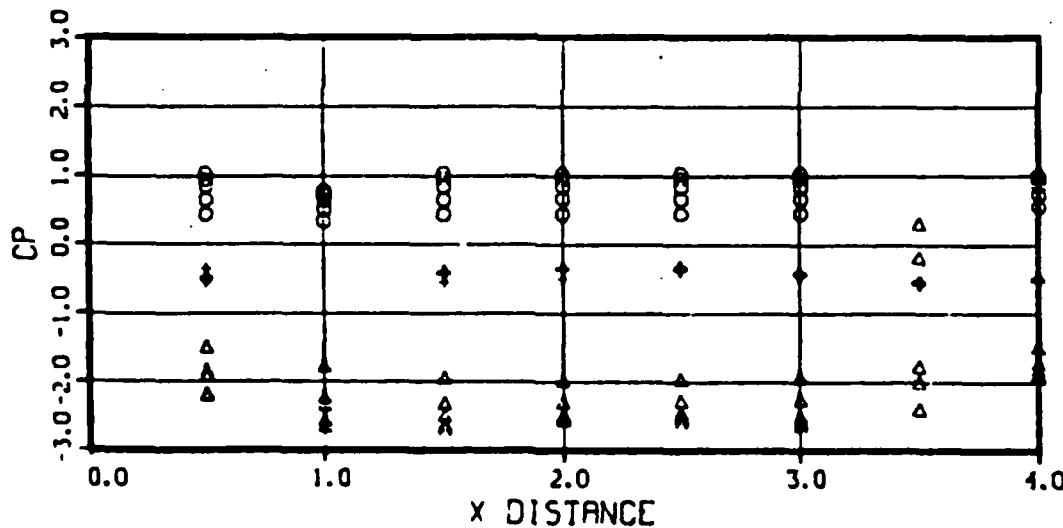
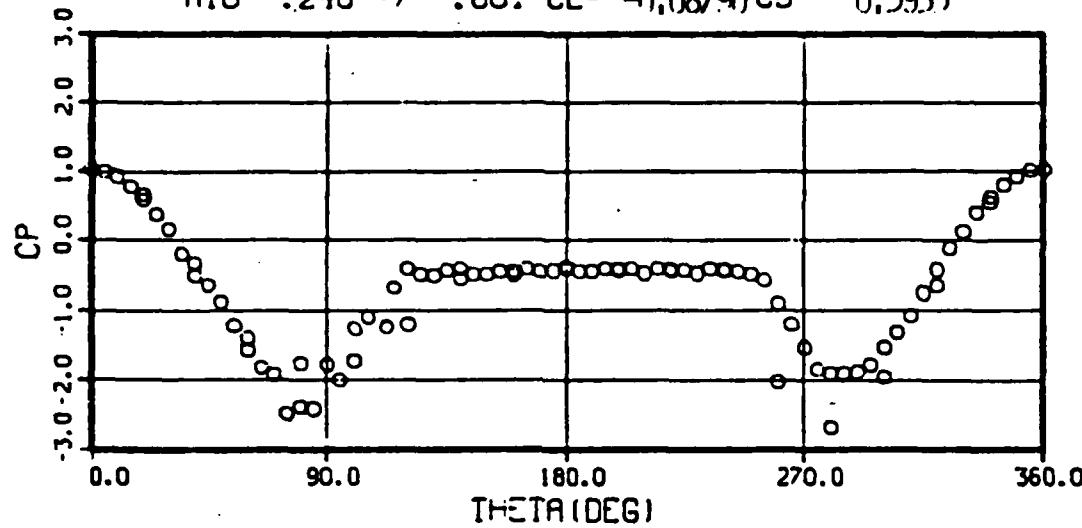
RUN 095 01U-219.0 +/- 1.32 RND1U-4.129 +/- .007  
P1U- 5104. +/- 10.00 V1U-283.40 +/- 1.014  
M1U- .248 +/- .001 CL- 0.0253 CD- 0.4553



CP VALUES ALONG LONGITUDINAL RAYS AT  
POLAR ANGLE OF 4DEG-0 64DEG-+ 124DEG-X.  
THE 5 SETS OF POINTS AT EACH LOCATION  
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

SMOOTH CYLINDER

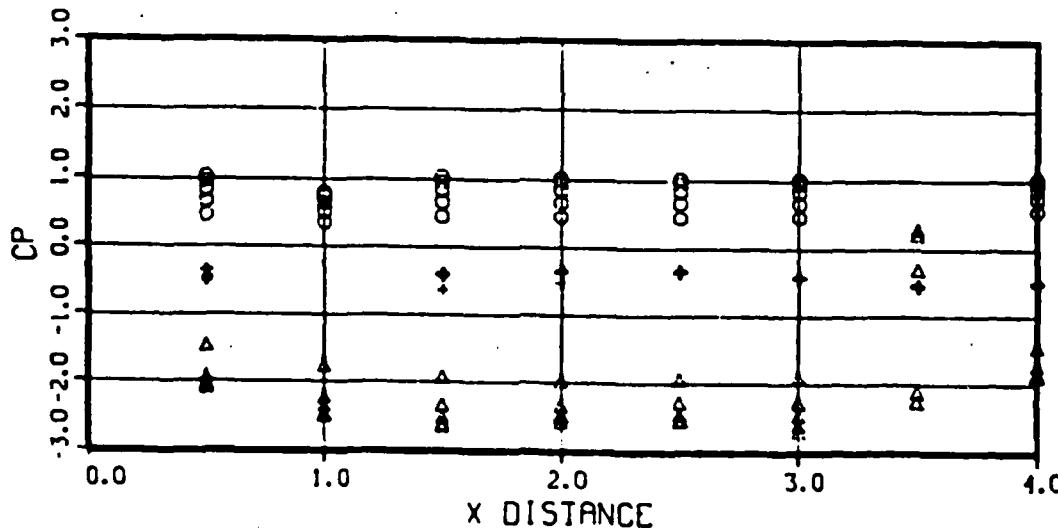
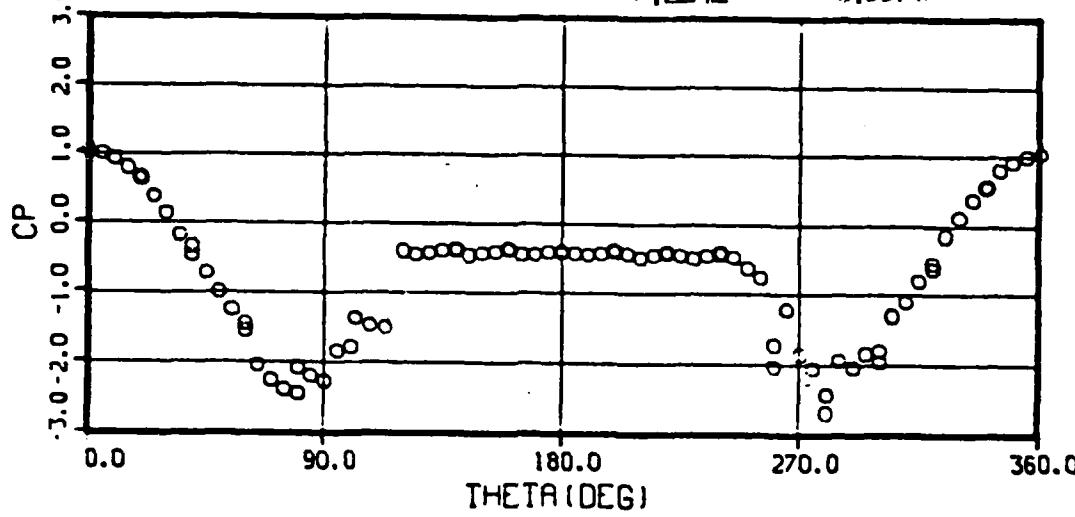
RUN C96 01U-16: .3 +/- .42 RND1U-3.066 +/- .010  
PIU- 3756. +/- 8.40 VIU-282.52 +/- .564  
MIU- .248 +/- .001 CL- -.08790 CD- 0.3953



CP VALUES ALONG LONGITUDINAL RAYS AT  
POLAR ANGLE OF 40DEG-0 64DEG-+ 124DEG-X.  
THE 5 SETS OF POINTS AT EACH LOCATION  
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

SMOOTH CYLINDER

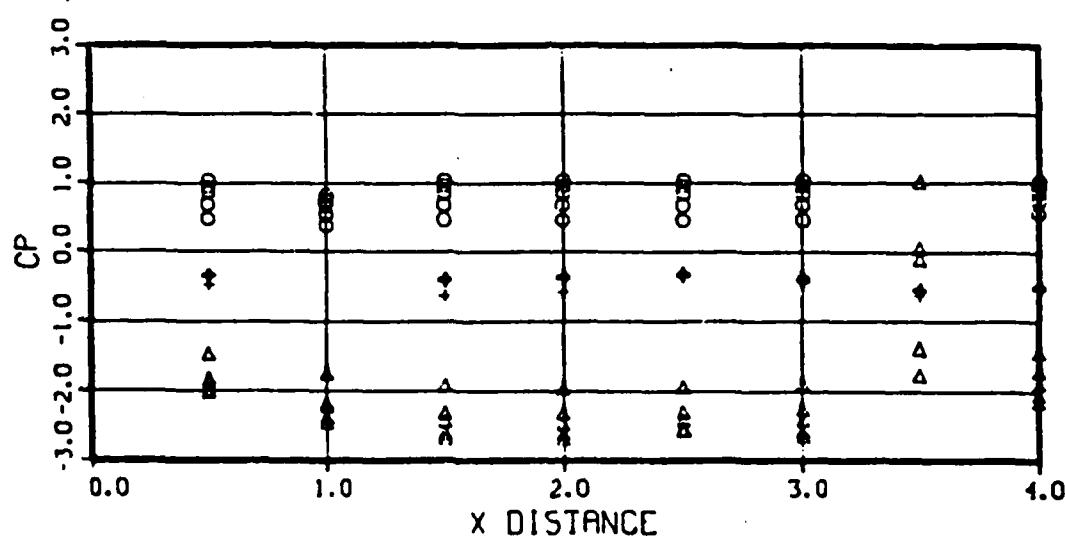
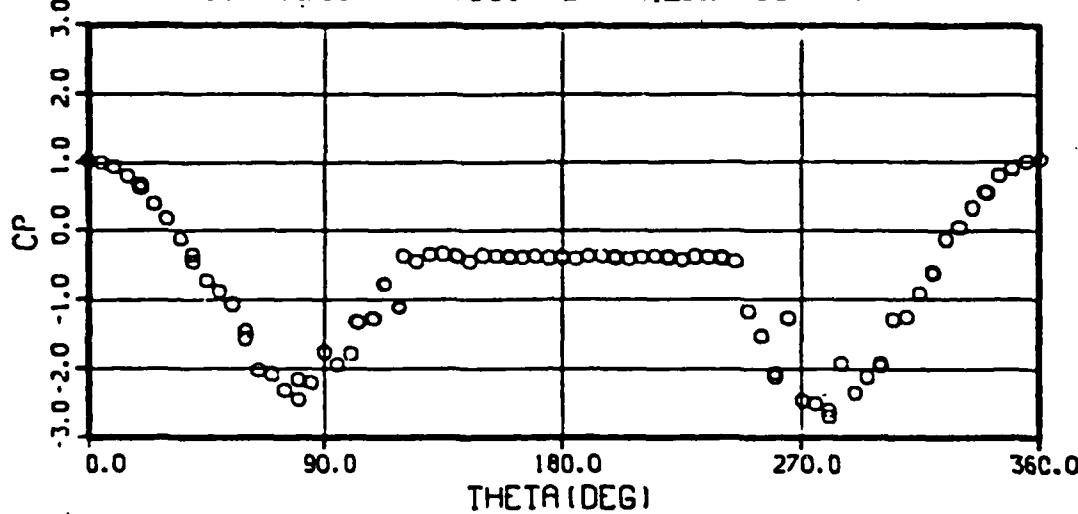
RUN 097 01U-135.2 +/- .80 RNDIU-2.569 +/- .013  
PIU- 3141. +/- 5.20 VIU-282.77 +/- .868  
MIU- .248 +/- .001 CL- -.2241 CD- 0.3376



CP VALUES ALONG LONGITUDINAL RAYS AT  
POLAR ANGLE OF 4DEG-0 64DEG-- 124DEG-X.  
THE 5 SETS OF POINTS AT EACH LOCATION  
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

SMOOTH CYLINDER

RUN 098 01U-107.4 +/- 1.20 RND1U-2.050 +/- .012  
PIU- 2497. +/- 5.40 VIU-282.21 +/- 1.694  
M1U- .248 +/- .001 CL- 0.1961 CD- 0.2998



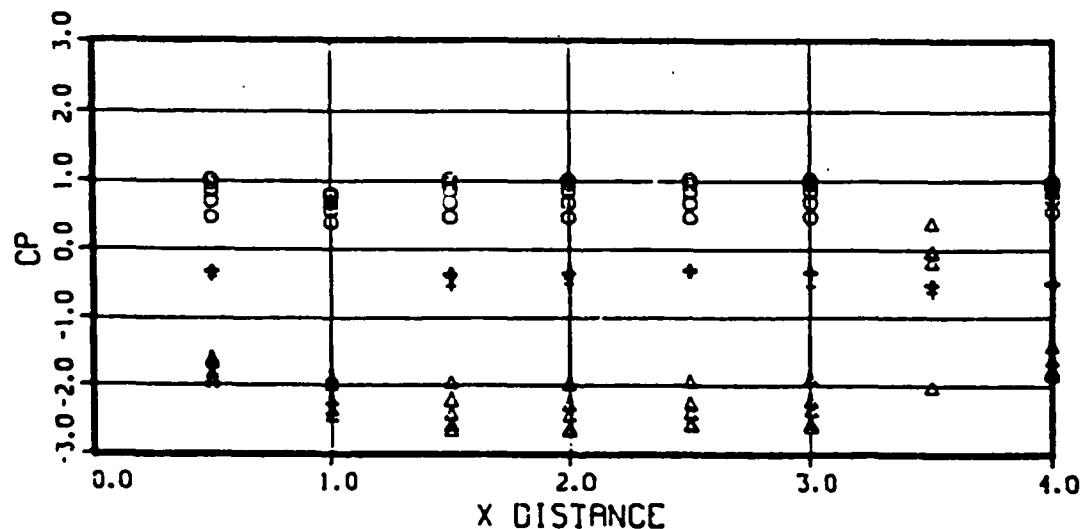
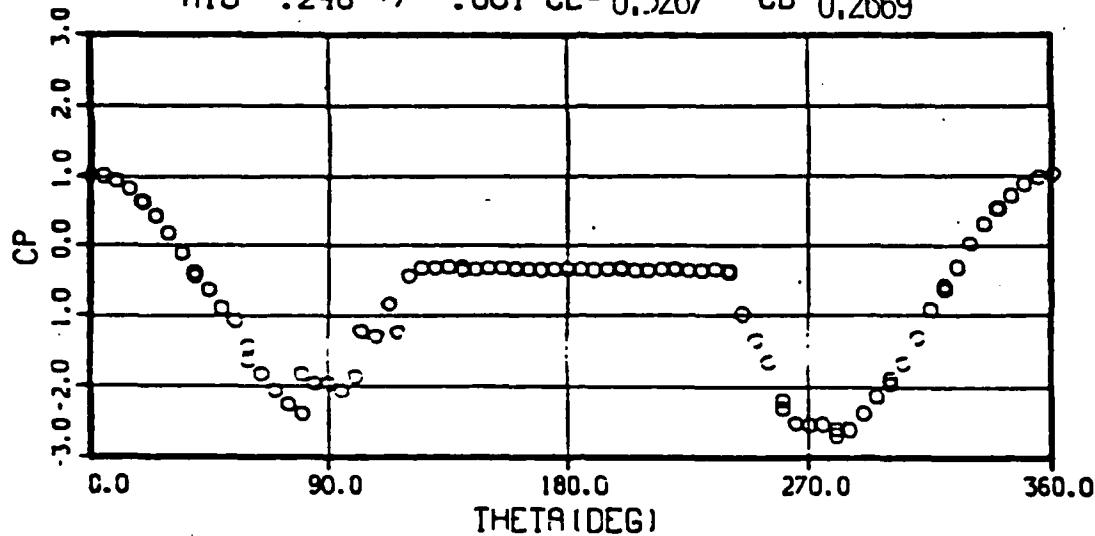
CP VALUES ALONG LONGITUDINAL RAYS AT  
POLAR ANGLE OF 40DEG-0 64DEG-+ 124DEG-X.  
THE 5 SETS OF POINTS AT EACH LOCATION  
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

SMOOTH CYLINDER

RUN 099 01U- 80.3 +/- .20 RND1U-1.535 +/- .002

P1U- 1856. +/- 4.40 VIU-282.51 +/- .326

MIU- .248 +/- .001 CL- 0.3267 CD-0.2669



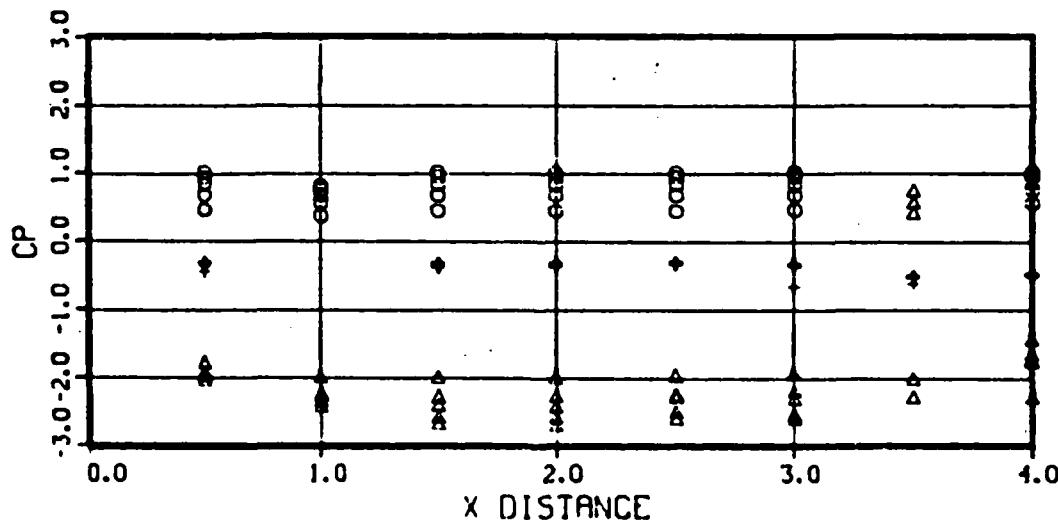
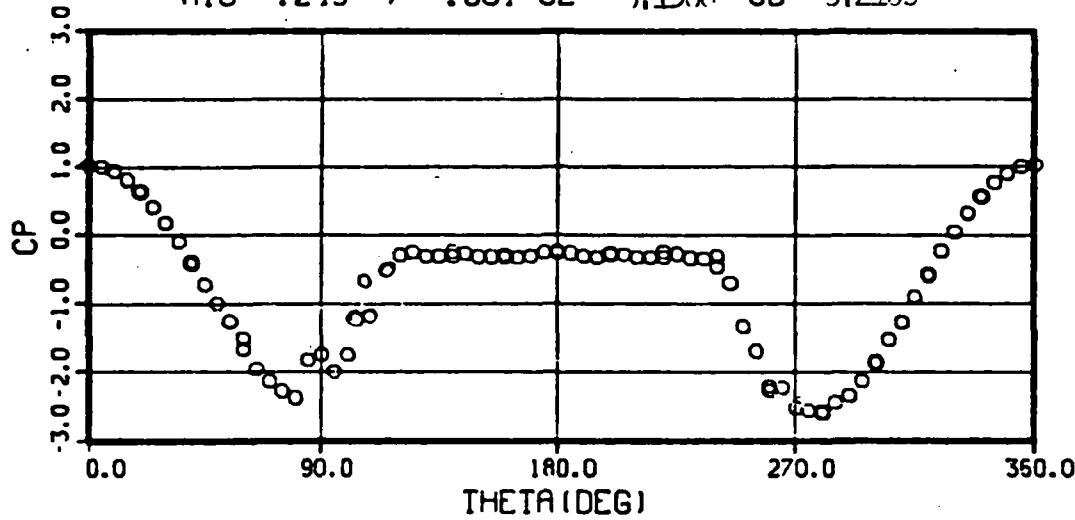
CP VALUES ALONG LONGITUDINAL RAYS AT  
POLAR ANGLE OF 40DEG-0 64DEG-+ 124DEG-X.  
THE 5 SETS OF POINTS AT EACH LOCATION  
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

SMOOTH CYLINDER

RUN 100 OIU- 67.1 +/- .16 RNDIU-1.280 +/- .003

P1U- 1540. +/- 2.20 V1U-283.25 +/- .238

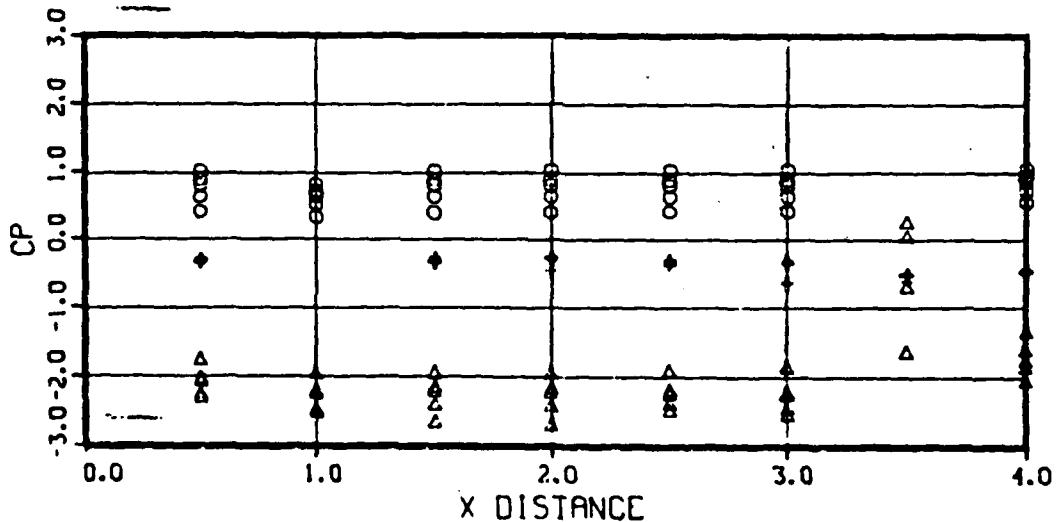
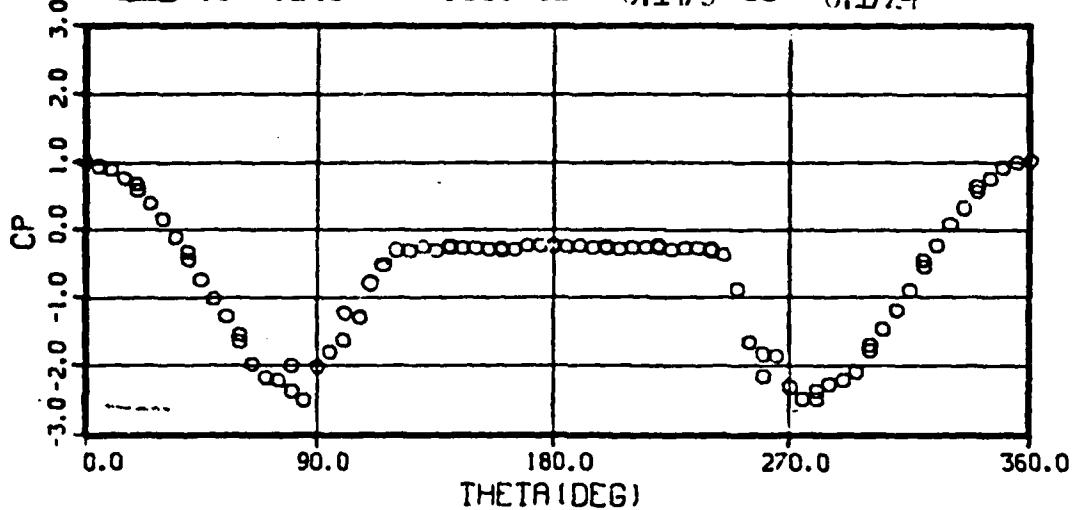
M1U- .249 +/- .001 CL- 0.1506 CD- 0.2109



CP VALUES ALONG LONGITUDINAL RAYS AT  
POLAR ANGLE OF 4DEG-0 64DEG-+ 124DEG-X.  
THE 5 SETS OF POINTS AT EACH LOCATION  
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

SMOOTH CYLINDER

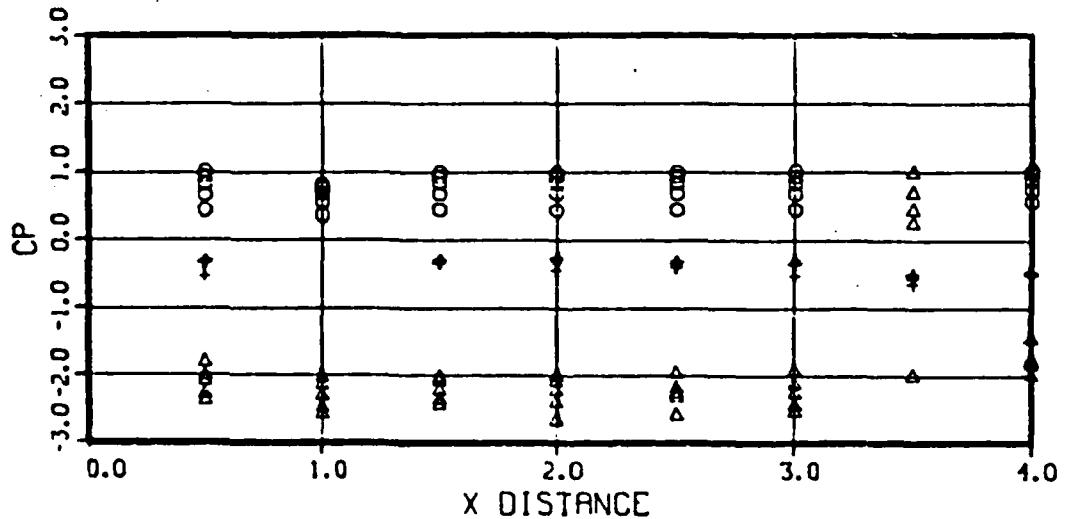
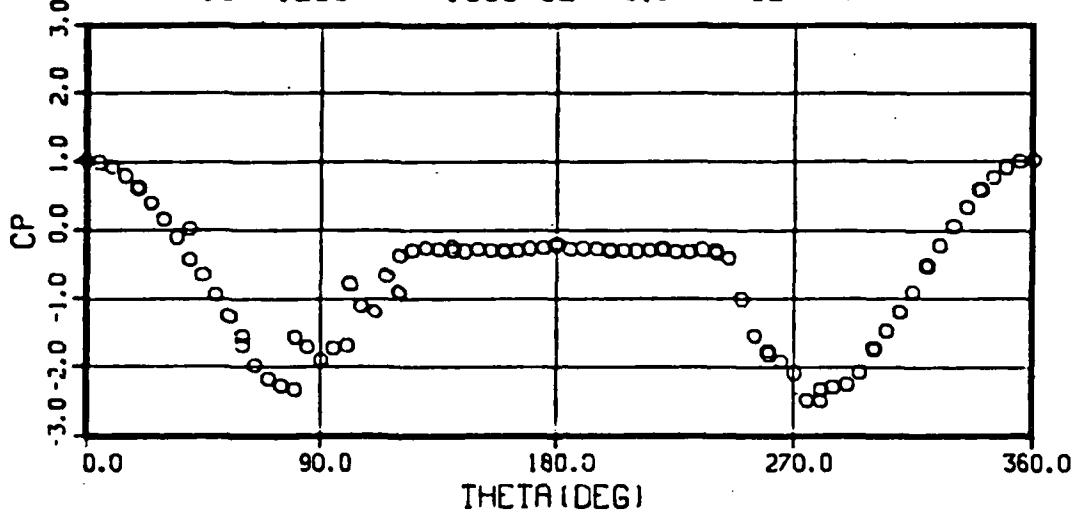
RUN 101 OIU- 54.0 +/- .32 RNDIU-1.040 +/- .004  
PIU- 1252. +/- 4.00 VIU-281.49 +/- 1.010  
MIU- .248 +/- .001 CL- 0.1479 CD- 0.1724



CP VALUES ALONG LONGITUDINAL RAYS AT  
POLAR ANGLE OF 4DEG-0 64DEG-+ 124DEG-X.  
THE 5 SETS OF POINTS AT EACH LOCATION  
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

SMOOTH CYLINDER

RUN 102 01U- 48.5 +/- .10 RNDIU- .929 +/- .002  
PIU- 1110. +/- 2.80 V1U-283.15 +/- .506  
MIU- .250 +/- .000 CL- 0.0387 CD- 0.1983



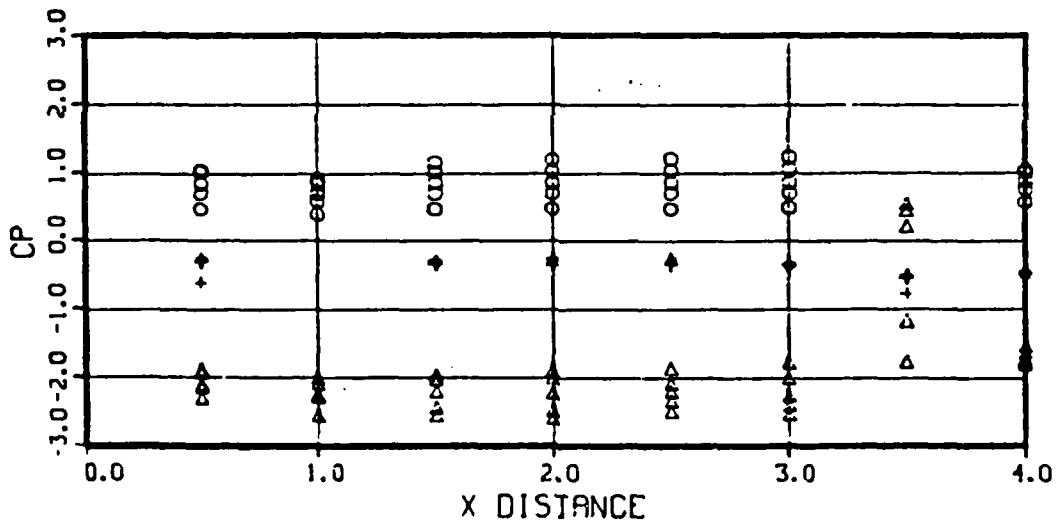
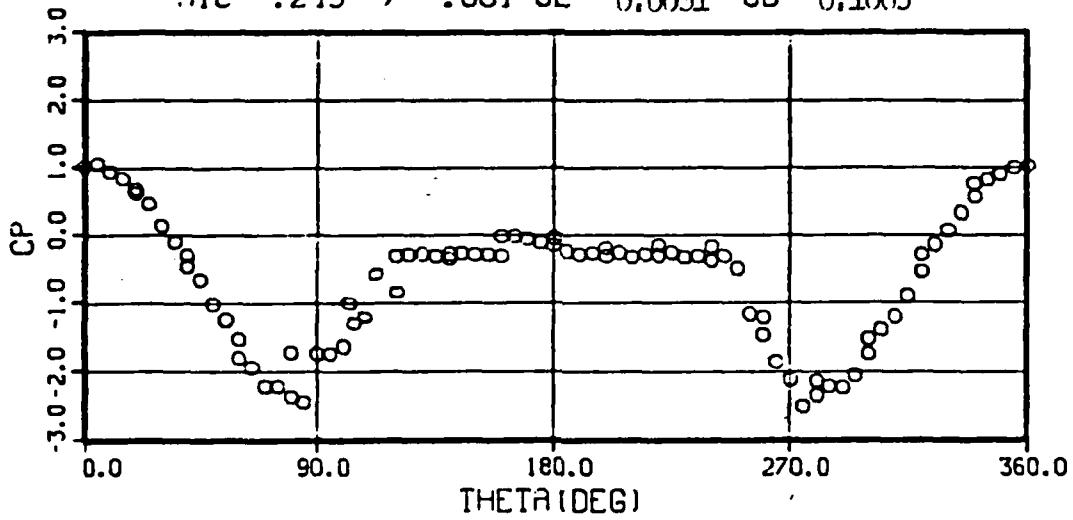
CP VALUES ALONG LONGITUDINAL RAYS AT  
POLAR ANGLE OF 40DEG-0 64DEG-+ 124DEG-X.  
THE 5 SETS OF POINTS AT EACH LOCATION  
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

SMOOTH CYLINDER

RUN 1C3 01U- 42.5 +/- .14 RND1U- .819 +/- .002

P1U- 979. +/- 3.20 V1U-282.09 +/- .588

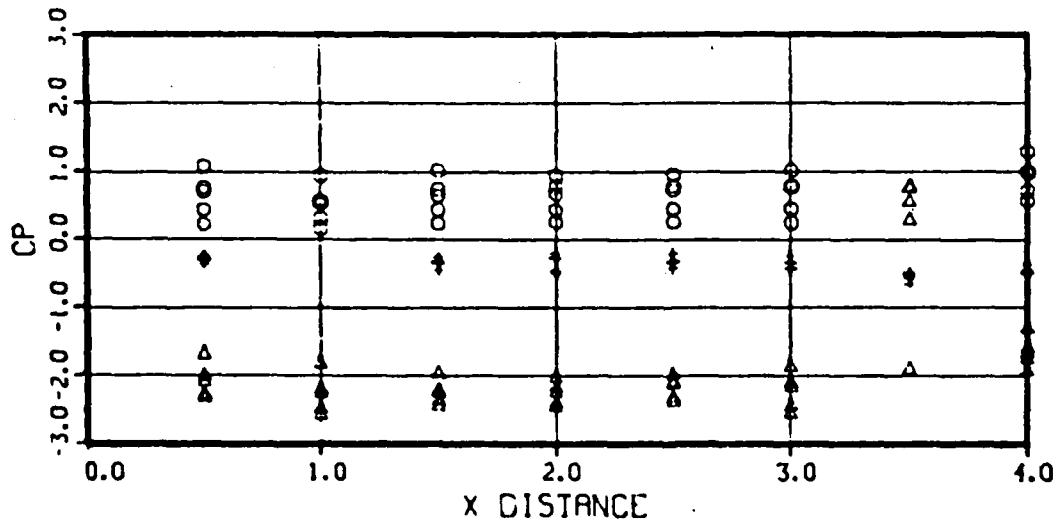
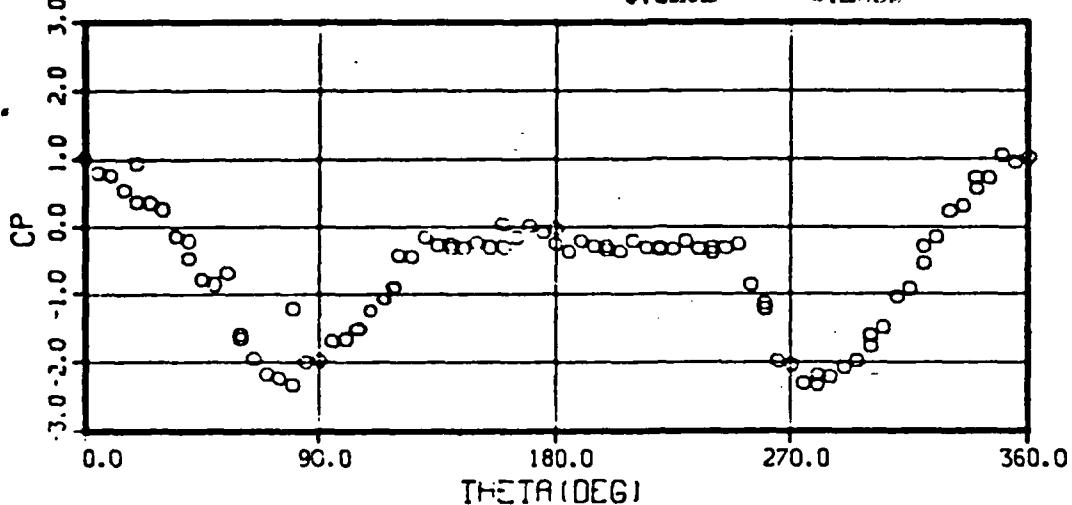
M1U- .249 +/- .001 CL- 0.0091 CD- 0.1669



CP VALUES ALONG LONGITUDINAL RAYS AT  
POLAR ANGLE OF 4DEG-0 64DEG-+ 124DEG-X.  
THE 5 SETS OF POINTS AT EACH LOCATION  
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

SMOOTH CYLINDER

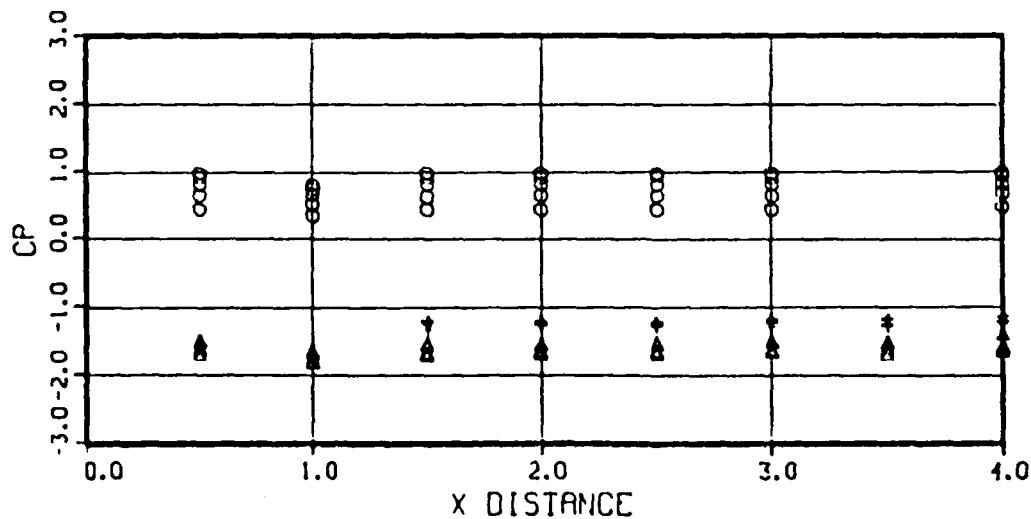
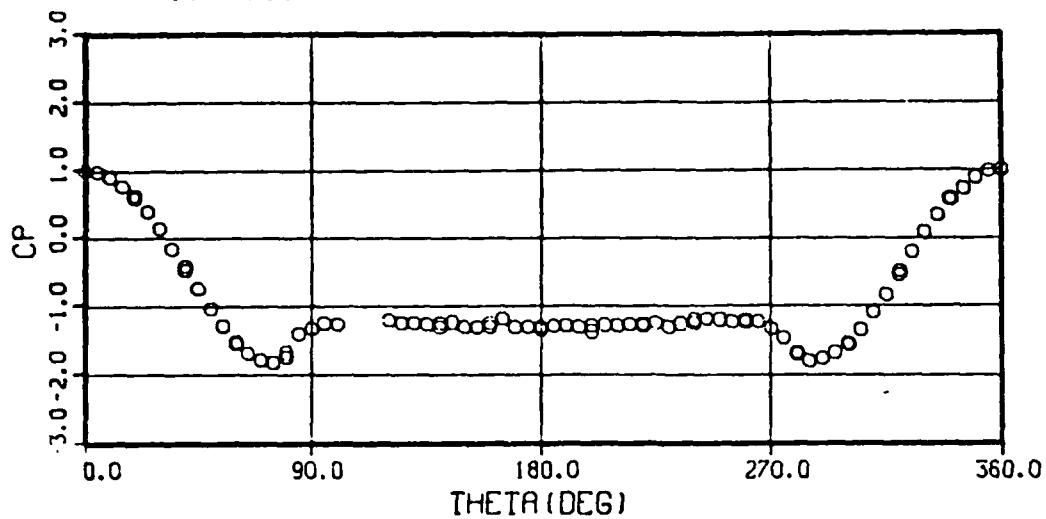
RUN 104 OIU- 37.0 +/- .00 RNDIU- .715 +/- .001  
PIU- 858. +/- 2.60 VIU-280.91 +/- .170  
MIU- .248 +/- .000 CL- -0.0161 CD- 0.2089



CP VALUES ALONG LONGITUDINAL RAYS AT  
POLAR ANGLE OF 4DEG-0 64DEG-+ 124DEG-X.  
THE 5 SETS OF POINTS AT EACH LOCATION  
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

CYLINDER • NO. 6 MESH SCREEN

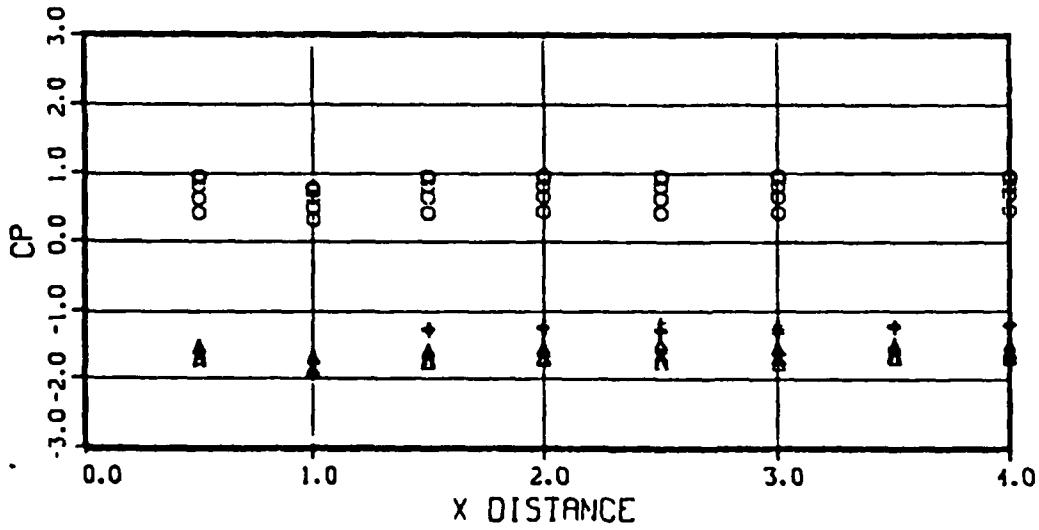
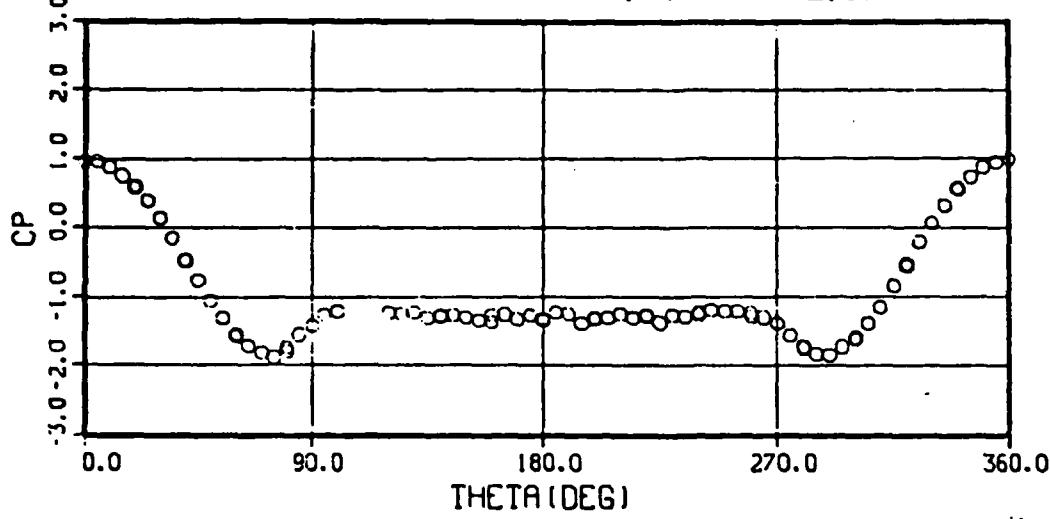
RUN 144 OIU- 25.2 +/- .00 RNDIU- .619 +/- .001  
PIU- 917. +/- 3.20 VIU-223.31 +/- .438  
MIU- .198 +/- .001 CL--0.00078 CD- 1.1541



CP VALUES ALONG LONGITUDINAL RAYS AT  
POLAR ANGLE OF 4DEG-0 64DEG-- 124DEG-X.  
THE 5 SETS OF POINTS AT EACH LOCATION  
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

CYLINDER • NO. 6 MESH SCREEN

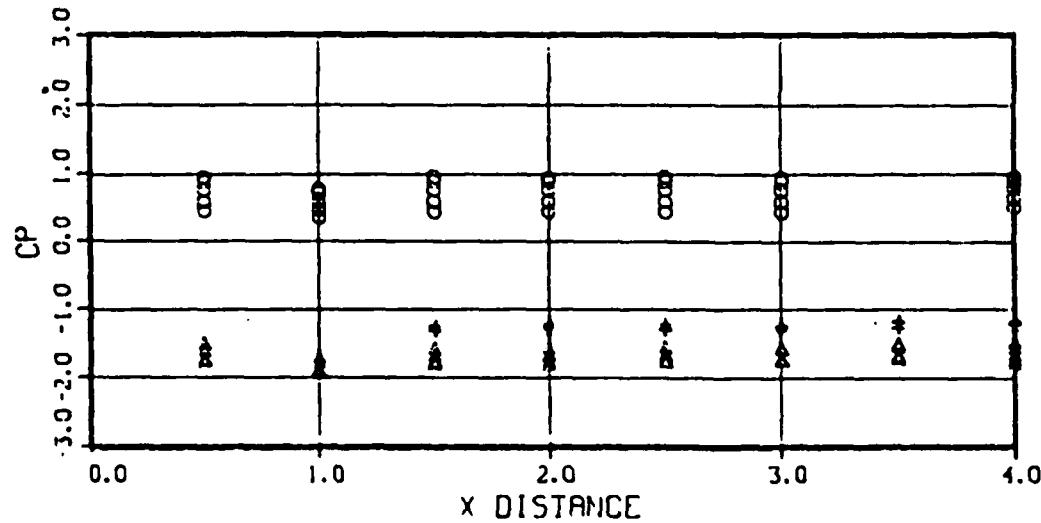
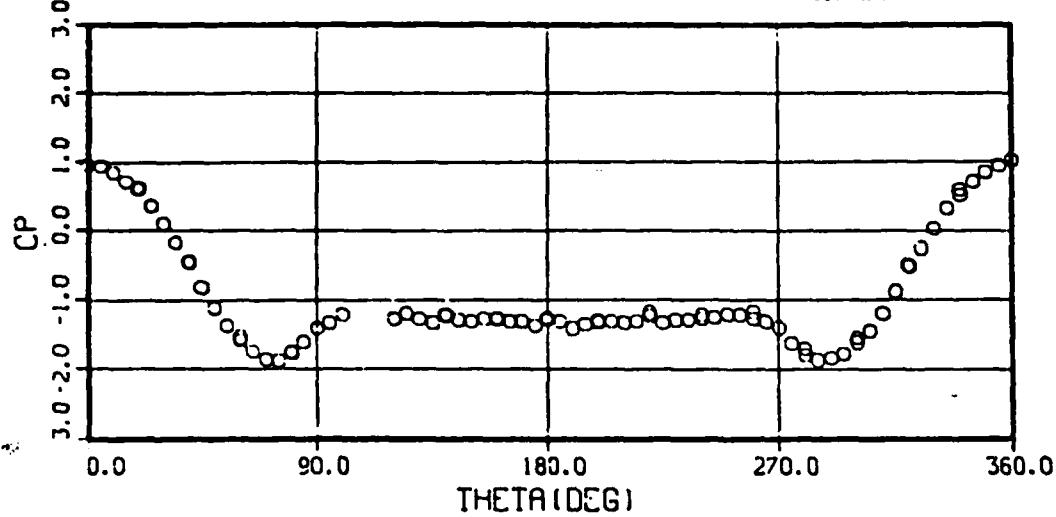
RUN 143 CIU- 20.8 +/- .00 RNDIU- .514 +/- .002  
PIU- 762. +/- 4.60 VIU-221.96 +/- .648  
MIU- .197 +/- .001 CL- -0.0075 CD- 1.1439



CP VALUES ALONG LONGITUDINAL RAYS AT  
POLAR ANGLE OF 40DEG-0 64DEG-> 124DEG-X.  
THE 5 SETS OF POINTS AT EACH LOCATION  
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

CYLINDER • NO. 6 MESH SCREEN

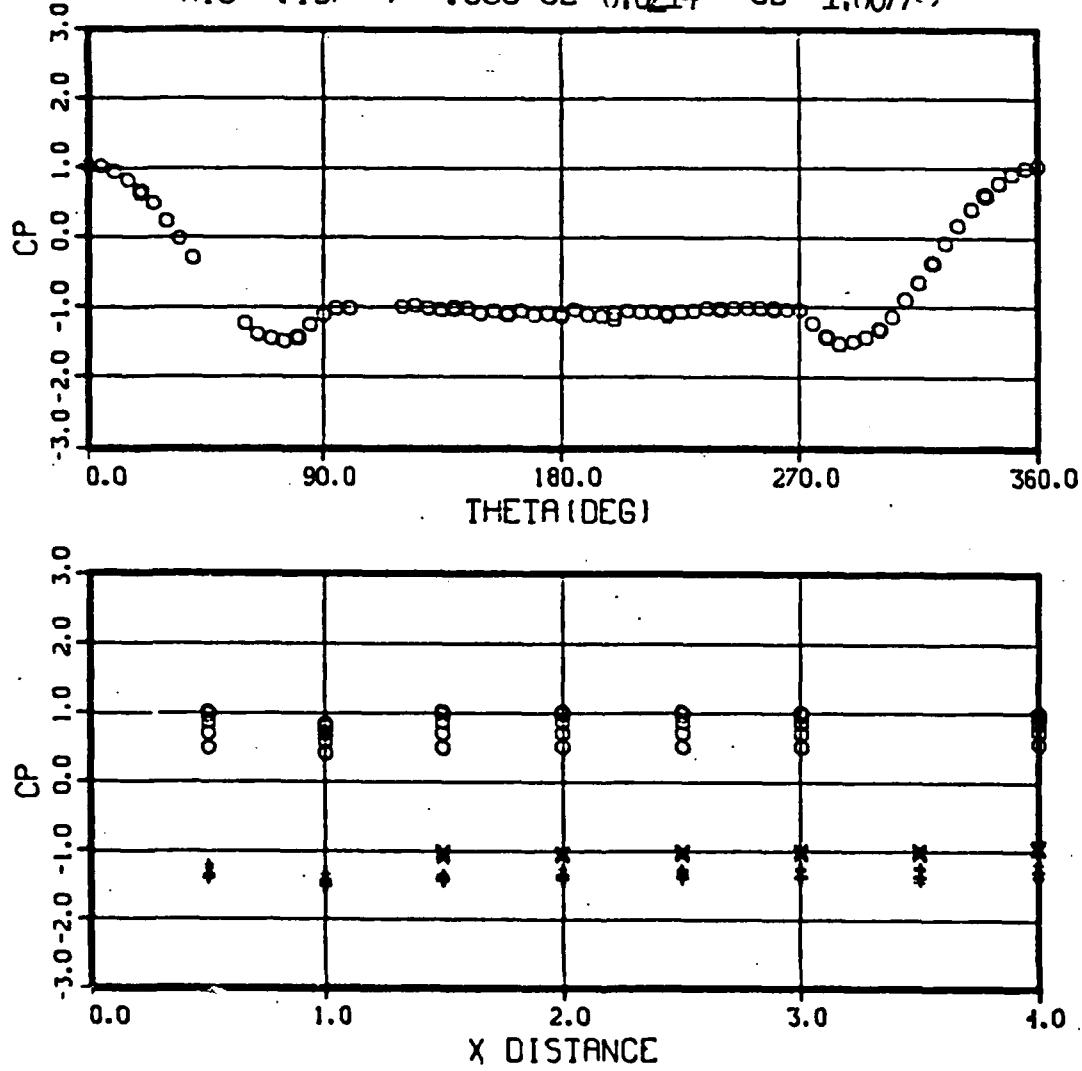
RUN 142 OIU- 16.5 +/- .40 RNDIU- .415 +/- .006  
PIU- 612. +/- 15.60 VIU-219.46 +/- .600  
MIU- .196 +/- .001 CL- -0.0041 CD- 1.1237



CP VALUES ALONG LONGITUDINAL RAYS AT  
POLAR ANGLE OF 4DEG-0 64DEG-+ 124DEG-X.  
THE 5 SETS OF POINTS AT EACH LOCATION  
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

CYLINDER + NO. 6 MESH SCREEN

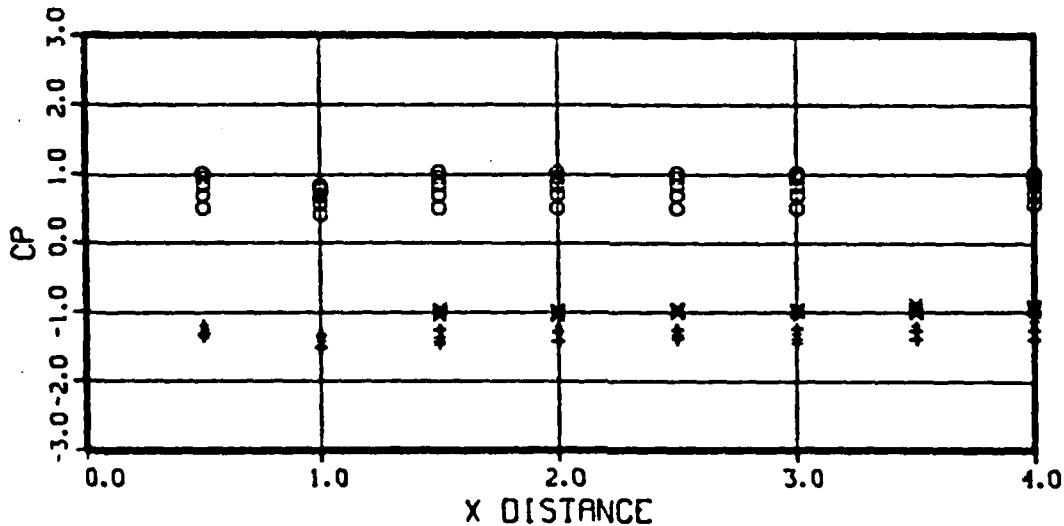
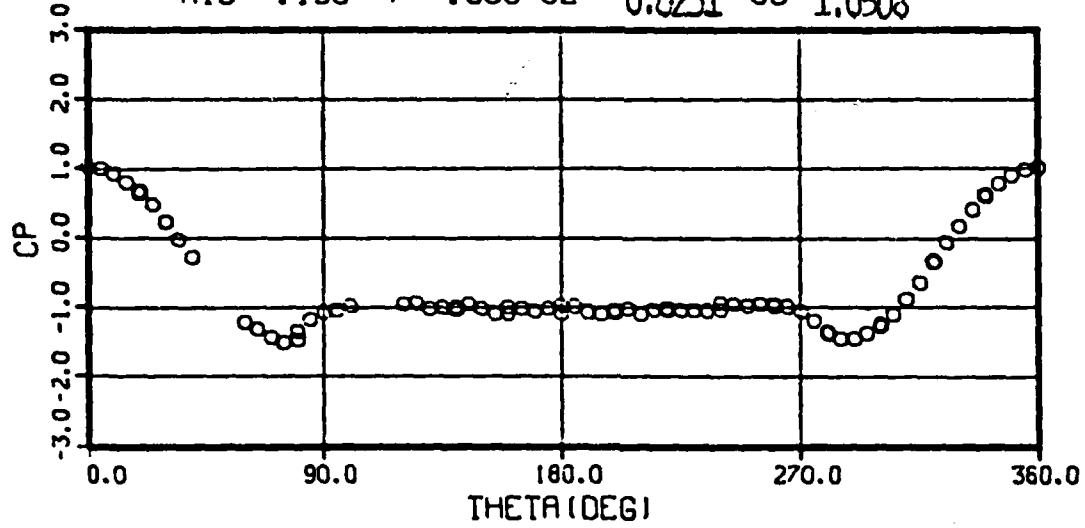
RUN 140 O1U- 51.8 +/- .00 RND1U-1.287 +/- .001  
PIU- 1904. +/- 5.20 V1U-221.34 +/- .222  
MIU- .197 +/- .000 CL-0.0214 CD- 1.0677



CP VALUES ALONG LONGITUDINAL RAYS AT  
POLAR ANGLE OF 40DEG-0 64DEG-+ 124DEG-X.  
THE 5 SETS OF POINTS AT EACH LOCATION  
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

CYLINDER + NO. 6 MESH SCREEN

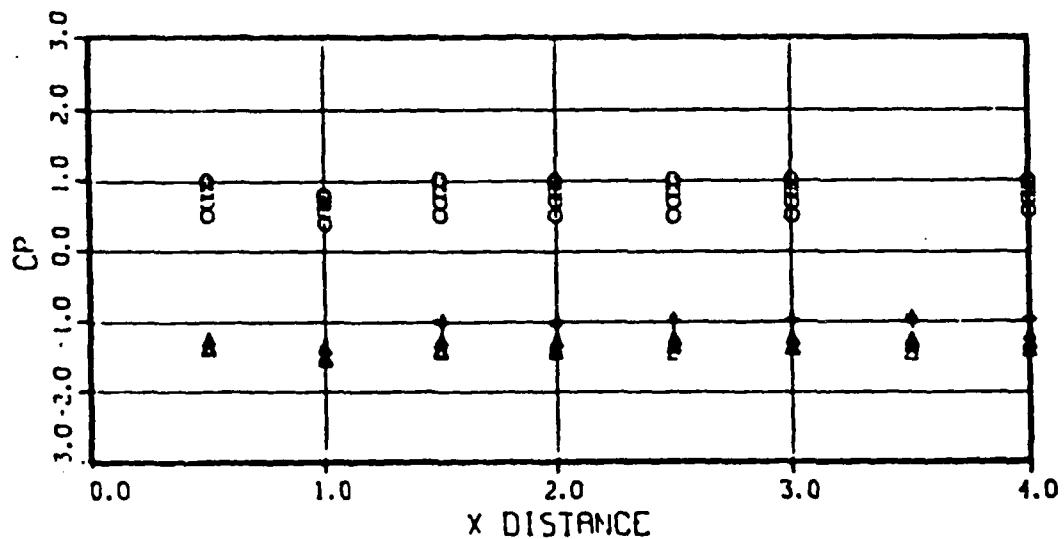
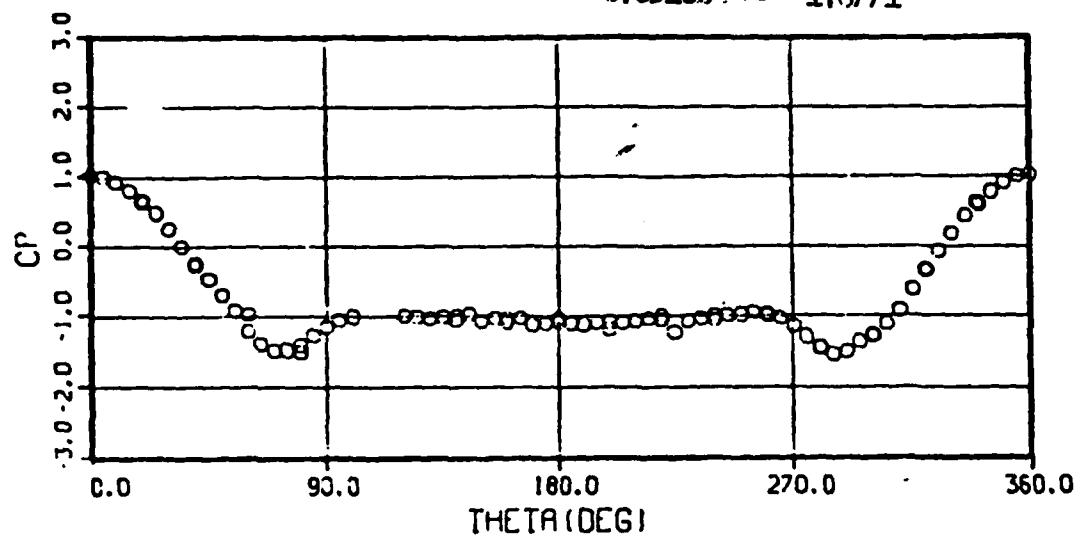
RUN 139 OIU- 61.3 +/- .18 RNDIU-1.537 +/- .004  
 PIU- 2231. +/- .60 VIU-221.38 +/- .688  
 MIU- .198 +/- .000 CL= 0.0251 CD-1.0508



CP VALUES ALONG LONGITUDINAL RAYS AT  
 POLAR ANGLE OF 4DEG-0 61DEG-+ 124DEG-X.  
 THE 5 SETS OF POINTS AT EACH LOCATION  
 CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

CYLINDER • NO. 6 MESH SCREEN

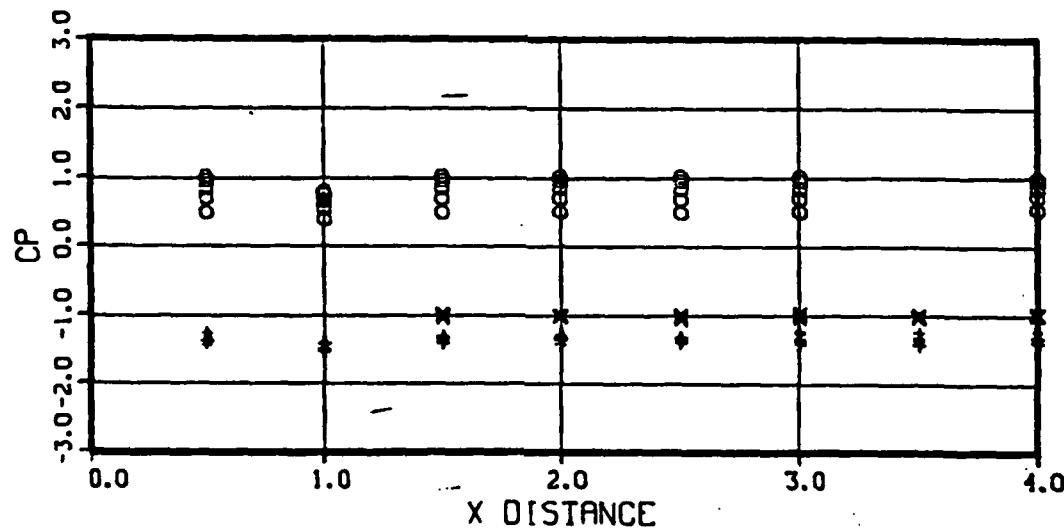
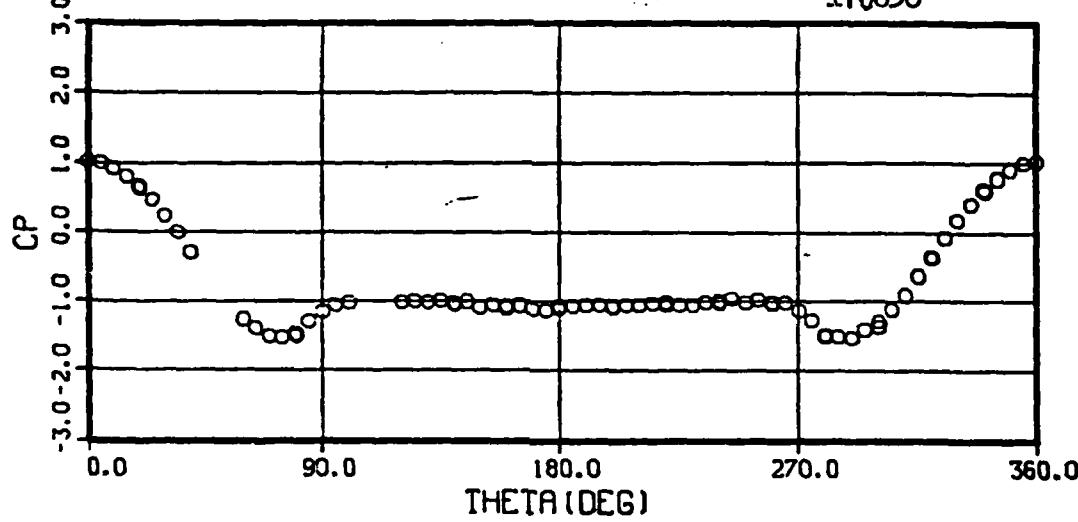
RUN :37 O1U- 86.4 +/- .30 RNDIU-2.064 +/- .004  
 P1U- 3000. +/- 1.60 V1U-228.72 +/- .422  
 MIU- .2C3 +/- .001 CL- 0.03186 CD- 1.0771



CP VALUES ALONG LONGITUDINAL RAYS AT  
 POLAR ANGLE OF 4DEG-0 64DEG-+ 124DEG-X.  
 THE 5 SETS OF POINTS AT EACH LOCATION  
 CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

CYLINDER + NO. 6 MESH SCREEN

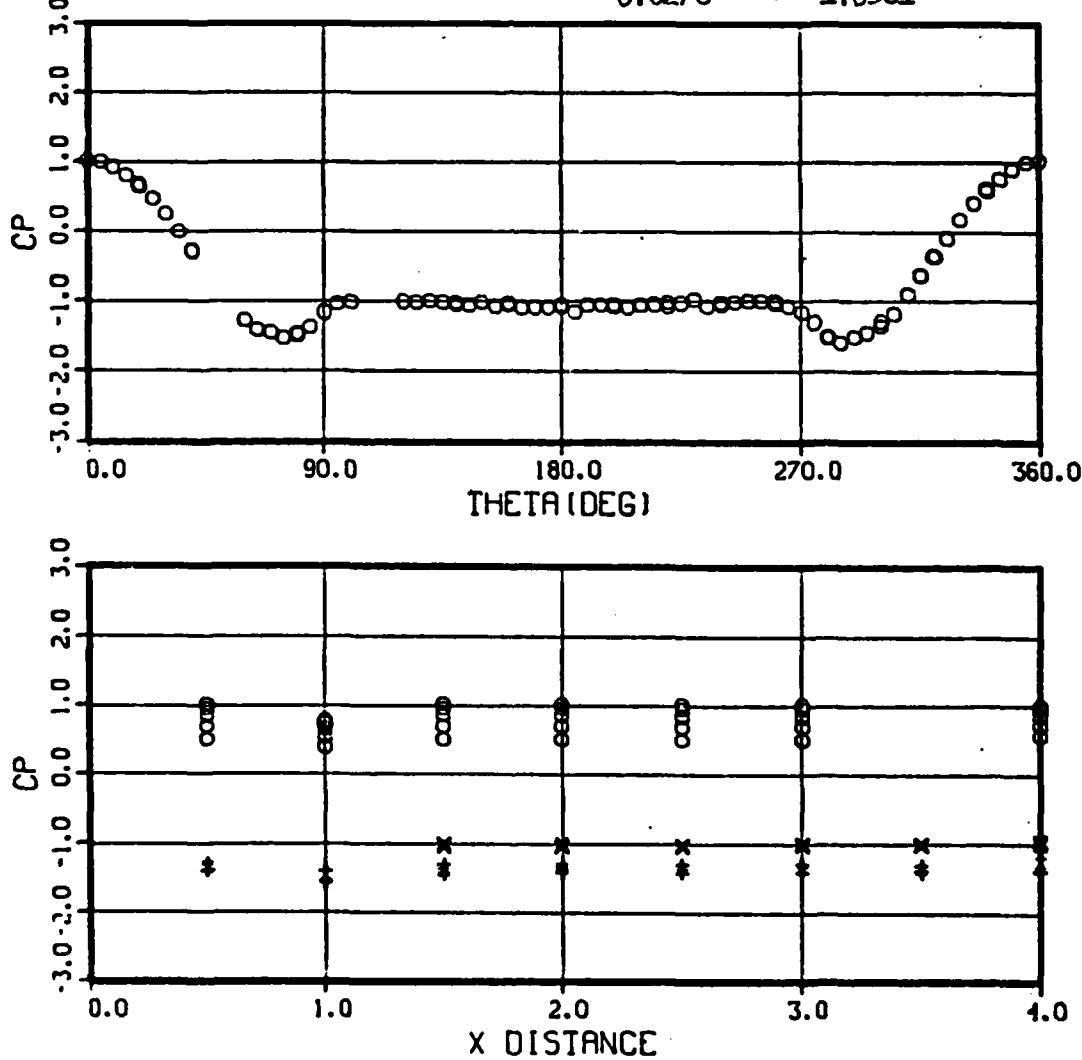
RUN 136 OIU-103.2 +/- .94 RNDIU-2.537 +/- .013  
 PIU- 3816. +/- 2.20 VIU-221.87 +/- .970  
 MIU- .196 +/- .001 CL- 0.0192 CD- 1.0638



CP VALUES ALONG LONGITUDINAL RAYS AT  
 POLAR ANGLE OF 4DEG-0 64DEG-+ 124DEG-X.  
 THE 5 SETS OF POINTS AT EACH LOCATION  
 CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

CYLINDER + NO. 6 MESH SCREEN

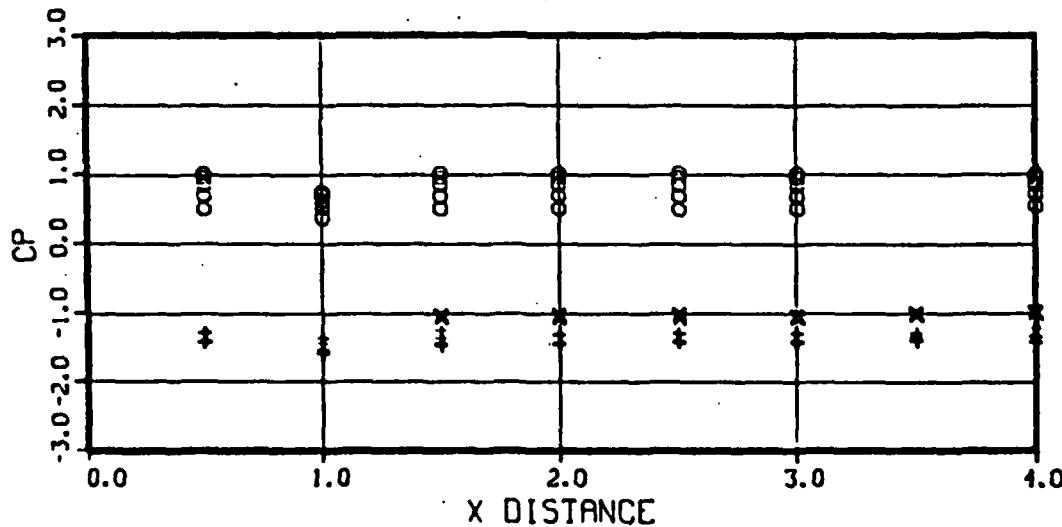
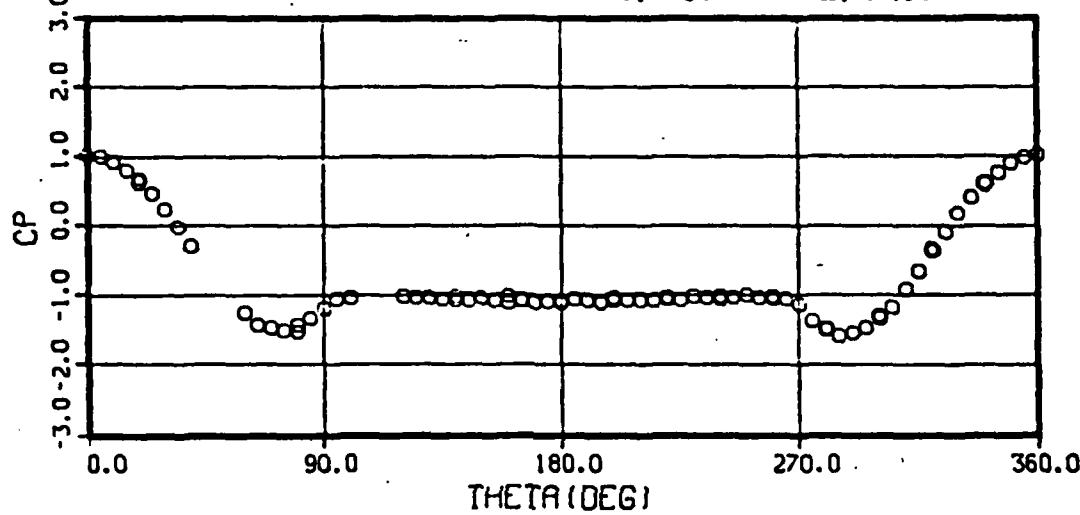
RUN 135 O1U-125.1 +/- 1.44 RND1U-3.049 +/- .014  
PIU- 4573. +/- 2.00 VIU-223.44 +/- 1.374  
MIU- .198 +/- .001 CL- 0.0276 CD- 1.0581



CP VALUES ALONG LONGITUDINAL RAYS AT  
POLAR ANGLE OF 4DEG-0 64DEG-+ 124DEG-X.  
THE 5 SETS OF POINTS AT EACH LOCATION  
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

CYLINDER + NO. 6 MESH SCREEN

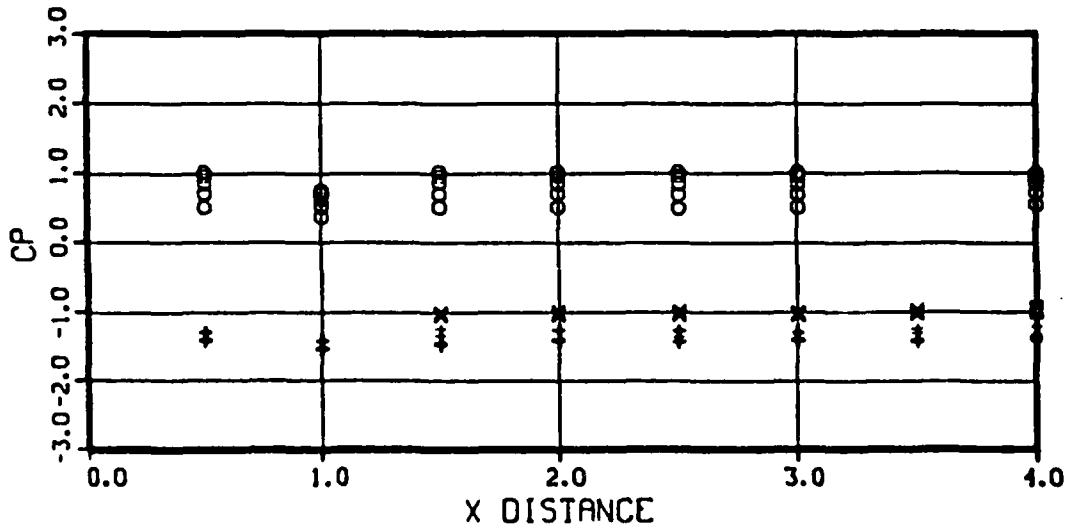
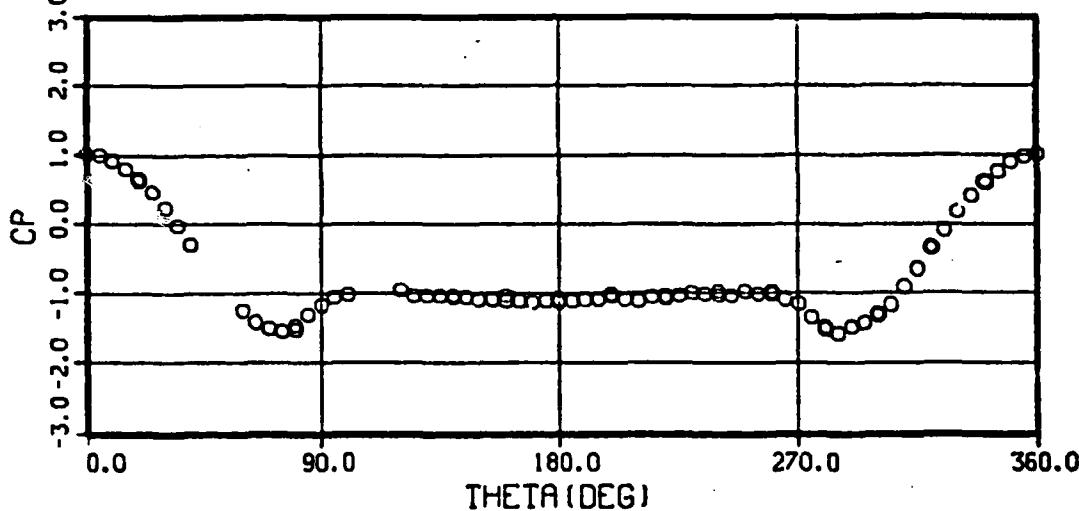
RUN 134 OIU-178.0 +/- 1.18 RNDIU-4.185 +/- .011  
PIU- 6139. +/- 5.60 VIU-230.68 +/- .830  
MIU- .204 +/- .001 CL- 0.0561 CD- 1.07400



CP VALUES ALONG LONGITUDINAL RAYS AT  
POLAR ANGLE OF 4DEG-0 64DEG-+ 124DEG-X.  
THE 5 SETS OF POINTS AT EACH LOCATION  
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

CYLINDER + NO. 6 MESH SCREEN

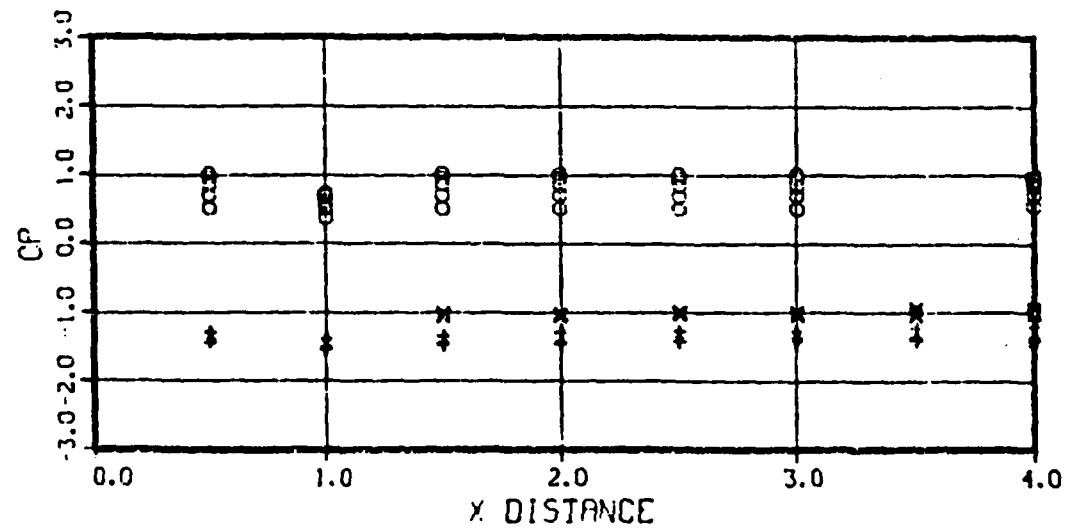
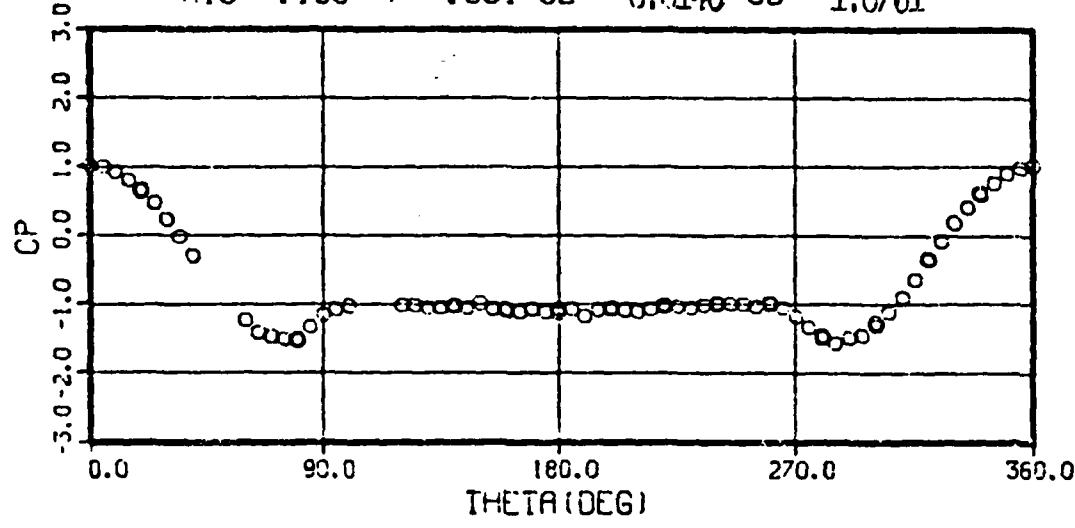
RUN 133 OIU-212.6 +/- 1.74 RNDIU-5.105 +/- .024  
PIU- 7751. +/- 3.60 VIU-224.99 +/- .898  
MIU- .198 +/- .001 CL- 0.0248 CD- 1.0378



CP VALUES ALONG LONGITUDINAL RAYS AT  
POLAR ANGLE OF 40DEG-0 64DEG-+ 124DEG-X.  
THE 5 SETS OF POINTS AT EACH LOCATION  
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

CYLINDER + NO. 6 MESH SCREEN

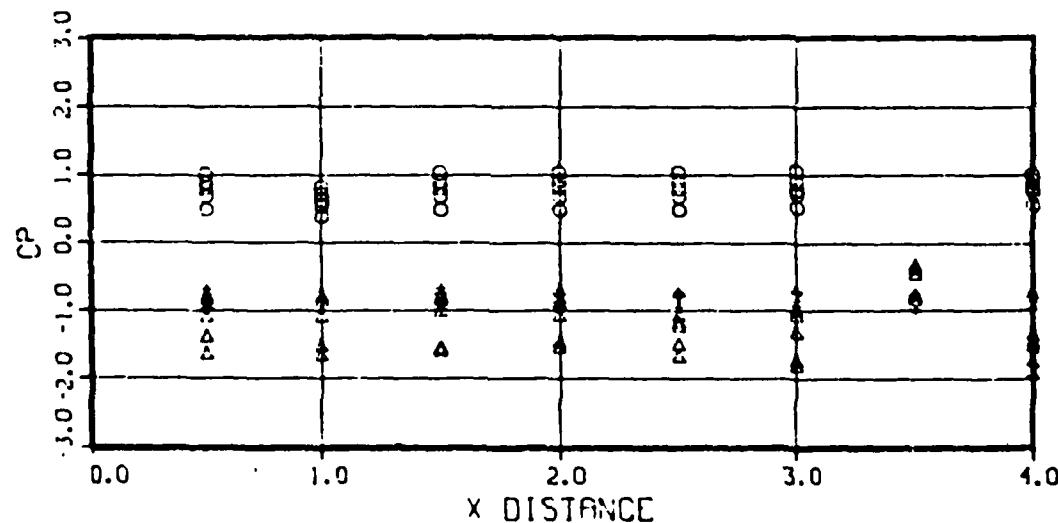
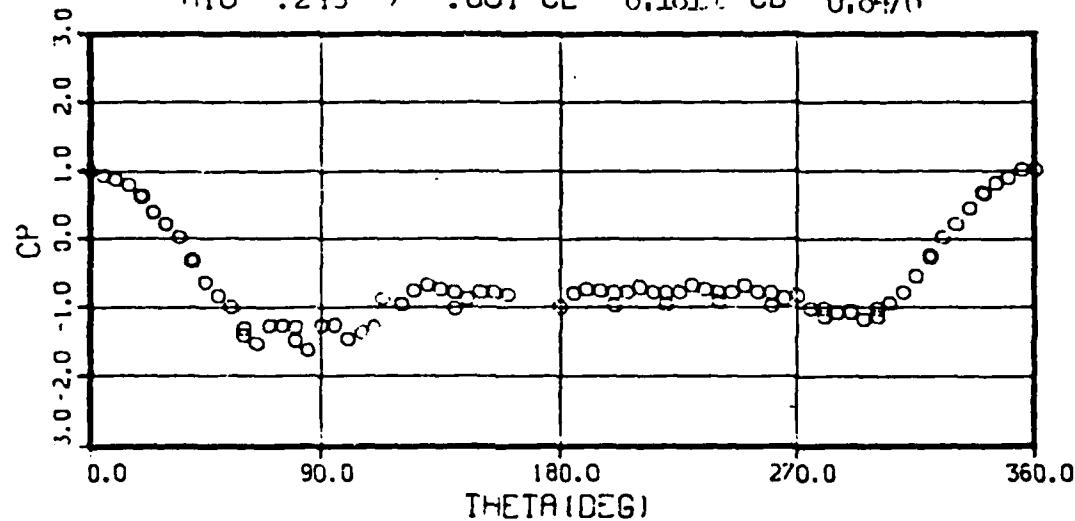
RUN 132 OIU-276.9 +/- 1.46 RNDIU-6.590 +/- .023  
PIU-10068. +/- 2.00 VIU-225.97 +/- .532  
MIU- .198 +/- .001 CL- 0.0146 CD- 1.0761



CP VALUES ALONG LONGITUDINAL RAYS AT  
POLAR ANGLE OF 4DEG-0 64DEG-+ 124DEG-X.  
THE 5 SETS OF POINTS AT EACH LOCATION  
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

SMOOTH CYLINDER

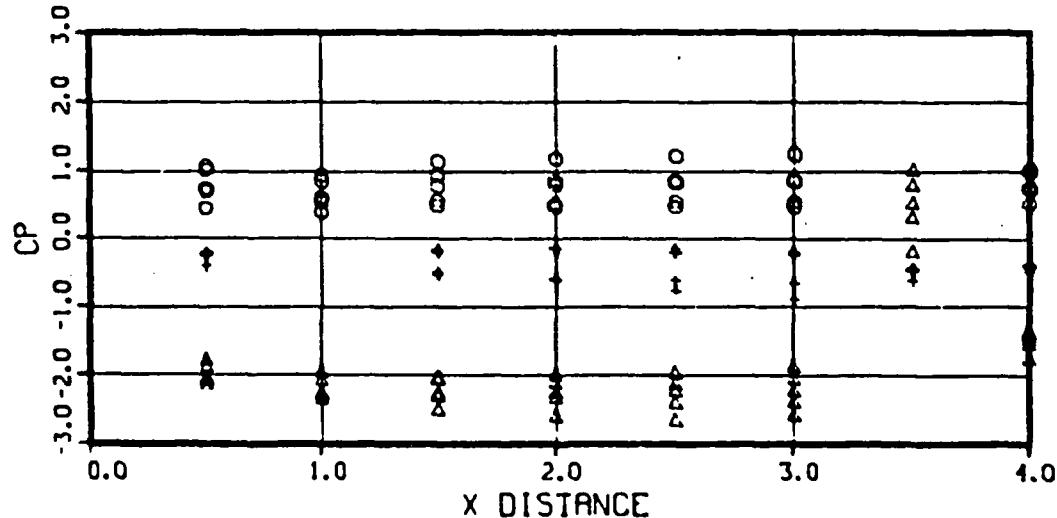
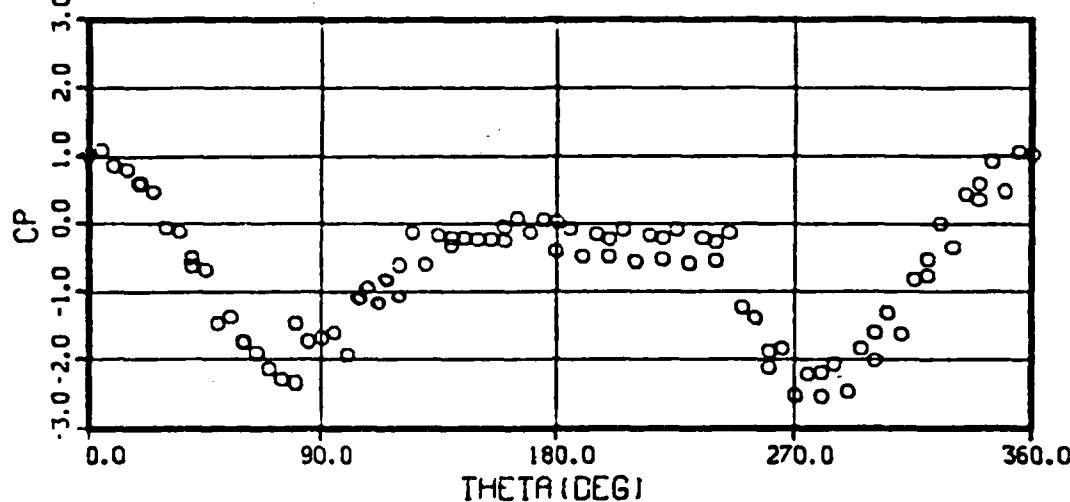
RUN 108 OIU- 21.2 +/- .16 RNDIU- .412 +/- .003  
PIU- 490. +/- 4.60 VIU-281.14 +/- .620  
MIU- .249 +/- .001 CL- -0.1819 CD- 0.8476



CP VALUES ALONG LONGITUDINAL RAYS AT  
POLAR ANGLE OF 4DEG-0 64DEG--> 124DEG-X.  
THE 5 SETS OF POINTS AT EACH LOCATION  
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

SMOOTH CYLINDER

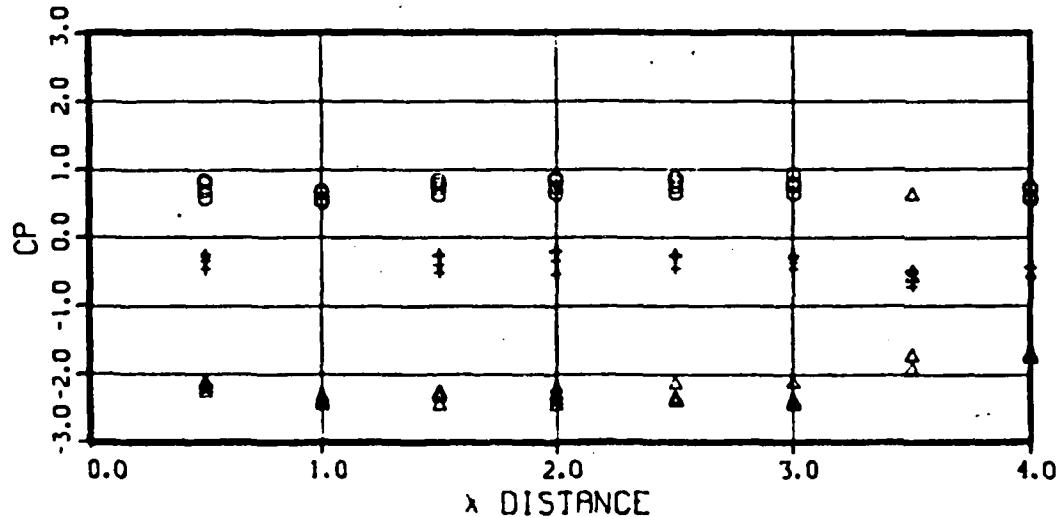
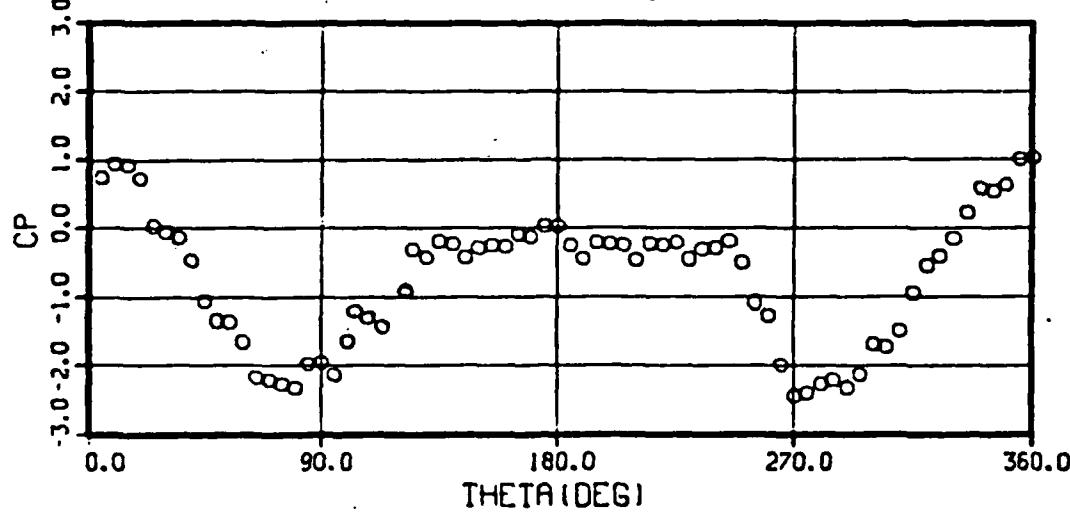
RUN 106 OIU- 26.4 +/- .12 RNDIU- .515 +/- .001  
PIU- 617. +/- 1.20 VIU-279.41 +/- .608  
MIU- .247 +/- .000 CL- 0.13170 CD- 0.1130



CP VALUES ALONG LONGITUDINAL RAYS AT  
POLAR ANGLE OF 4DEG-0 64DEG-+ 124DEG-X.  
THE 5 SETS OF POINTS AT EACH LOCATION  
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

SMOOTH CYLINDER

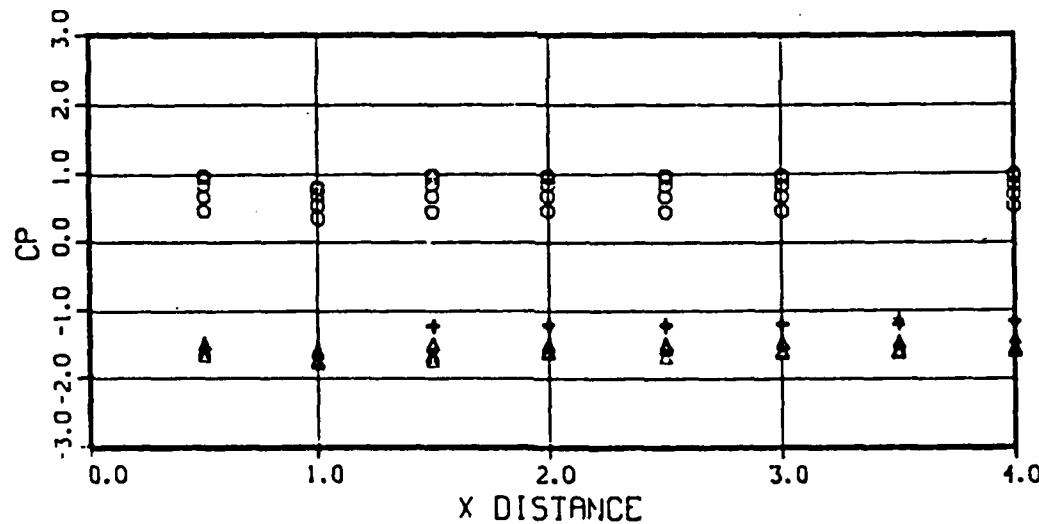
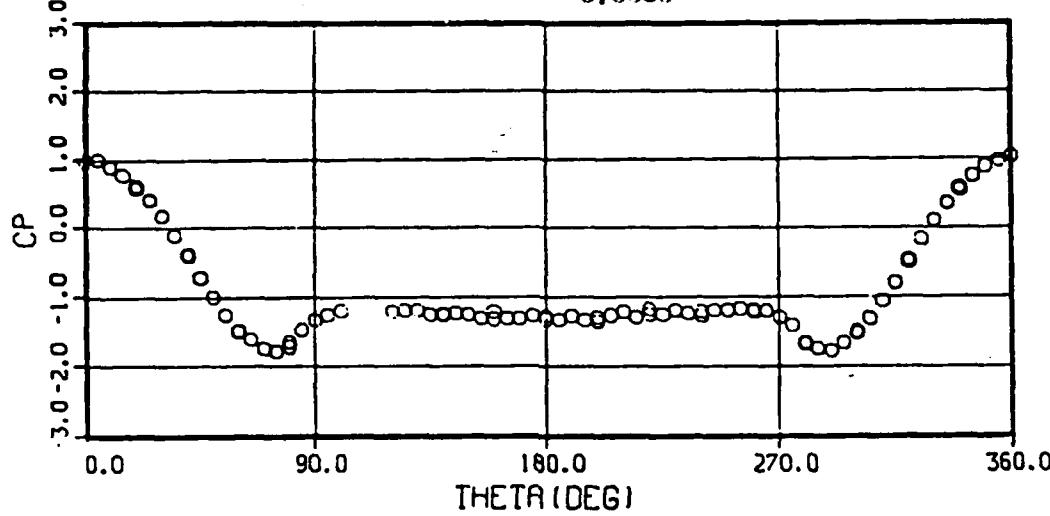
RUN 105 O1U- 31.7 +/- .08 RND1U- .617 +/- .001  
PIU- 741. +/- 1.00 VIU-279.62 +/- .233  
MIU- .247 +/- .000 CL- -0.0226 CD- 0.1740



CP VALUES ALONG LONGITUDINAL RAYS AT  
POLAR ANGLE OF 40deg-0 64deg-+ 124deg-x.  
THE 5 SETS OF POINTS AT EACH LOCATION  
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

CYLINDER + NO. 6 MESH SCREEN

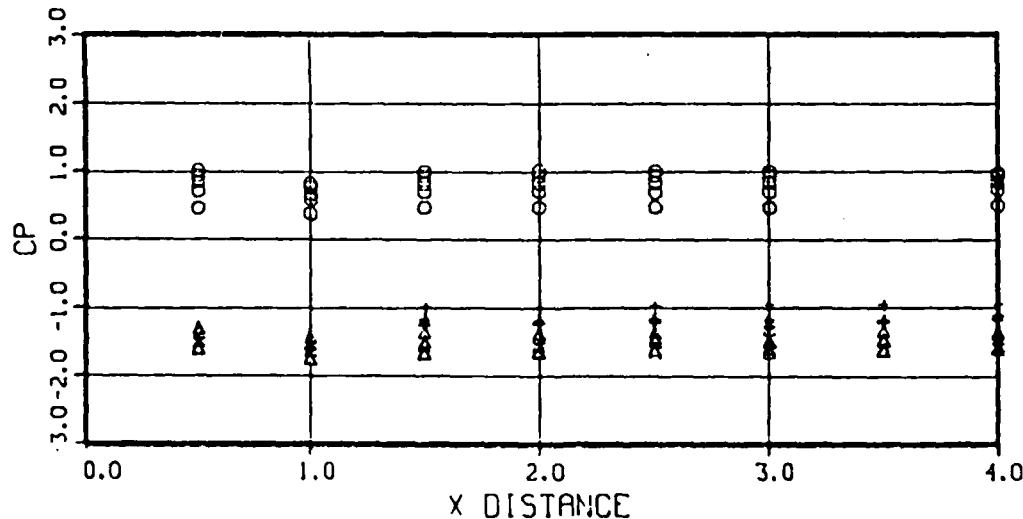
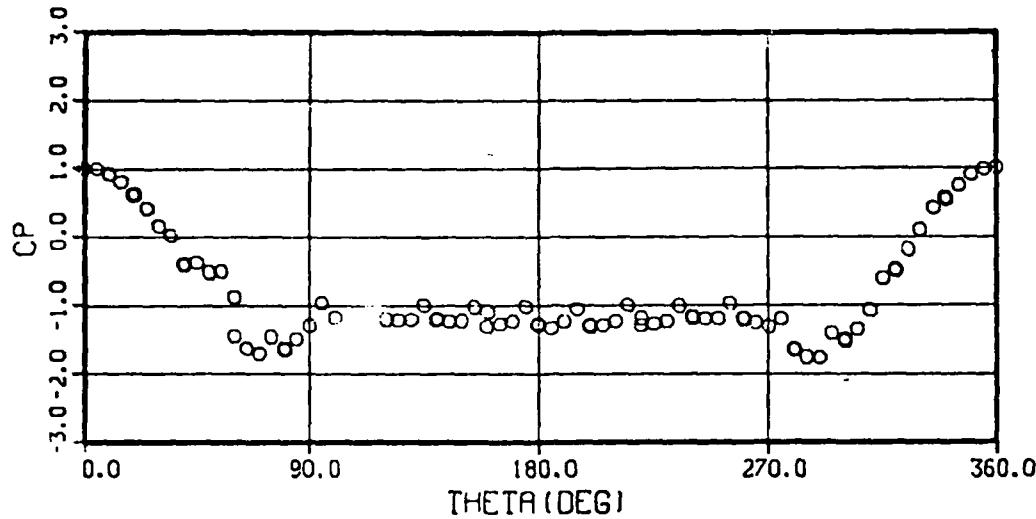
RUN 145 OIU- 29.9 +/- .00 RNDIU- .727 +/- .002.  
PIU- 1081. +/- 4.00 VIU-224.11 +/- .404  
MIU- .199 +/- .001 CL- -0.0080 CD- 1.1541



CP VALUES ALONG LONGITUDINAL RAYS AT  
POLAR ANGLE OF 4DEG-0 64DEG--+ 124DEG-X.  
THE 5 SETS OF POINTS AT EACH LOCATION  
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

CYLINDER + NO. 6 MESH SCREEN

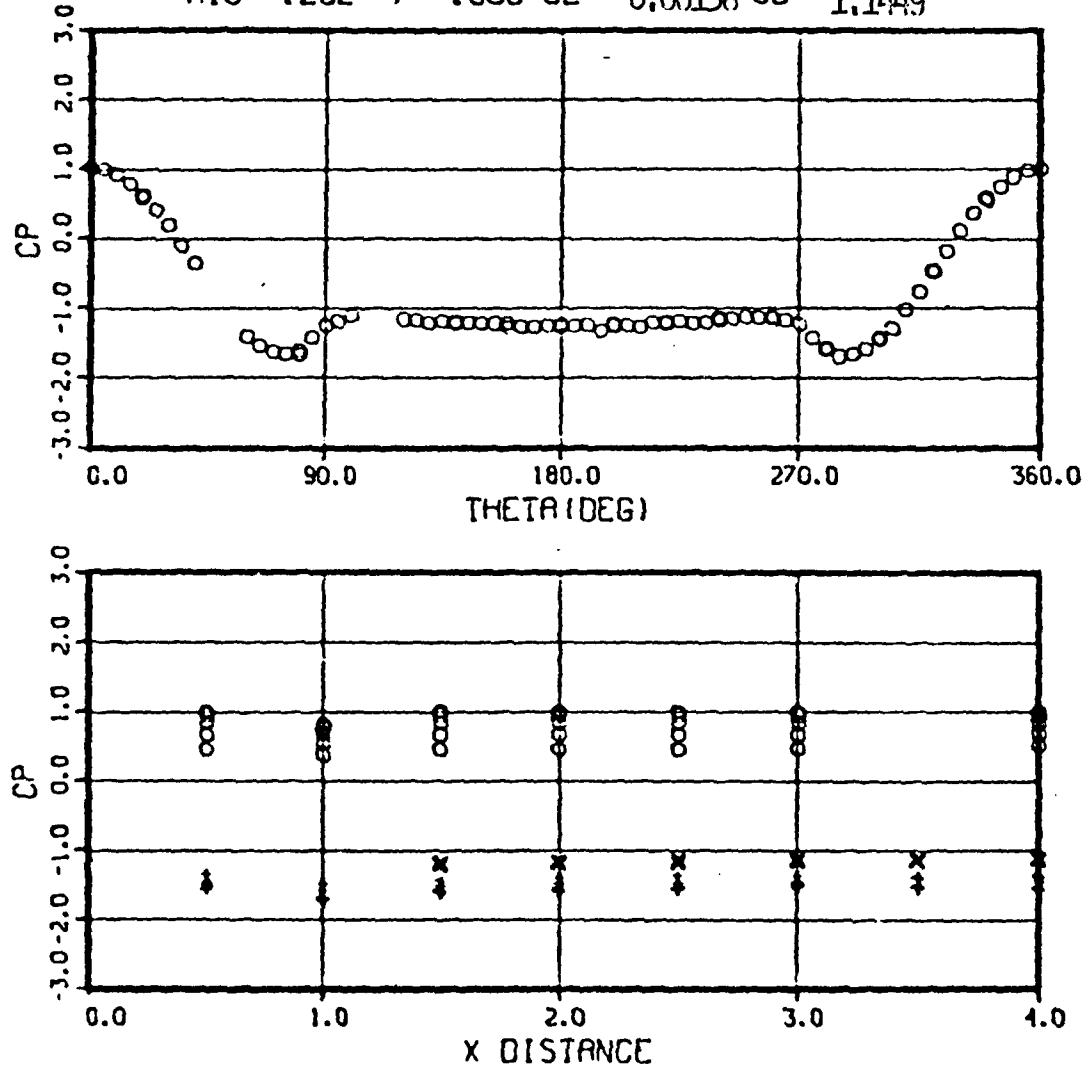
RUN 146 OIU- 34.4 +/- 3.16 RNDIU- .831 +/- .038  
PIU- 1232. +/- 4.40 VIU-225.82 +/- 10.158  
MIU- .200 +/- .009 CL- 0.067 CD- 1.15330



CP VALUES ALONG LONGITUDINAL RAYS AT  
POLAR ANGLE OF 4DEG-0 64DEG-+ 124DEG-X.  
THE 5 SETS OF POINTS AT EACH LOCATION  
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

CYLINDER + NO. 6 MESH SCREEN

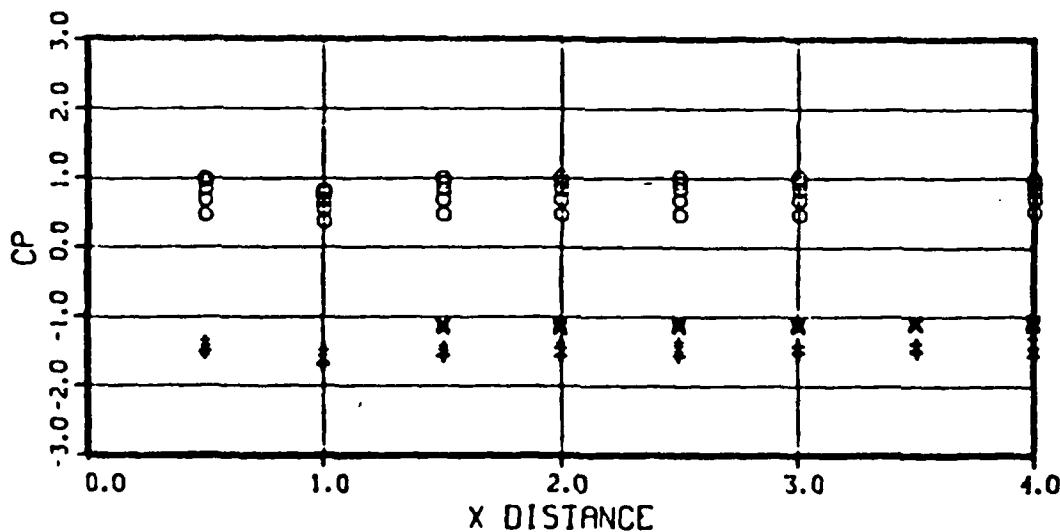
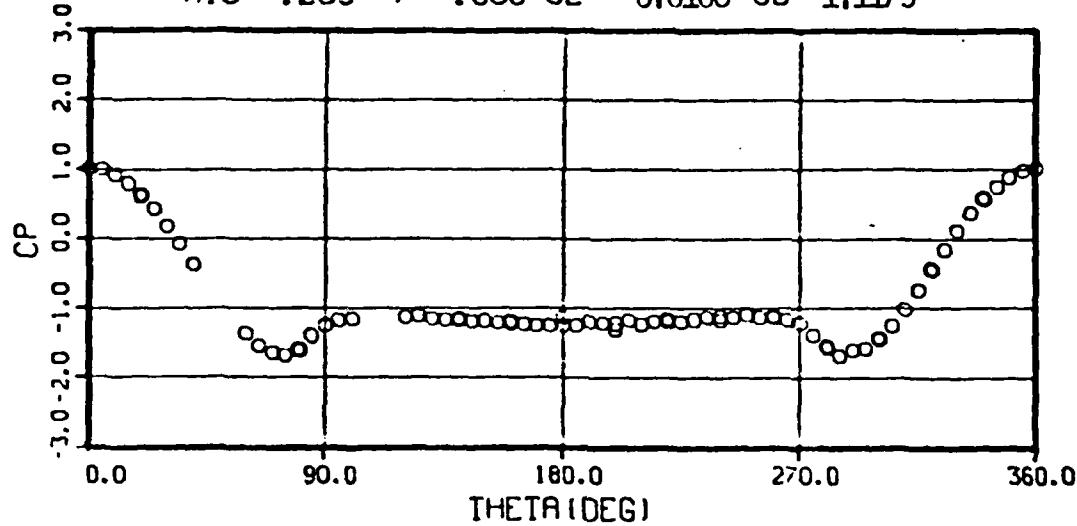
RUN 147 OIU- 39.8 +/- .10 RNDIU- .947 +/- .003  
PIU- 1393. +/- 3.60 VIU-228.57 +/- .116  
MIU- .2C2 +/- .000 CL- -0.00158 CD- 1.1449



CP VALUES ALONG LONGITUDINAL RAYS AT  
POLAR ANGLE OF 4DEG-0 64DEG-+ 124DEG-X.  
THE 5 SETS OF POINTS AT EACH LOCATION  
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

CYLINDER + NO. 6 MESH SCREEN

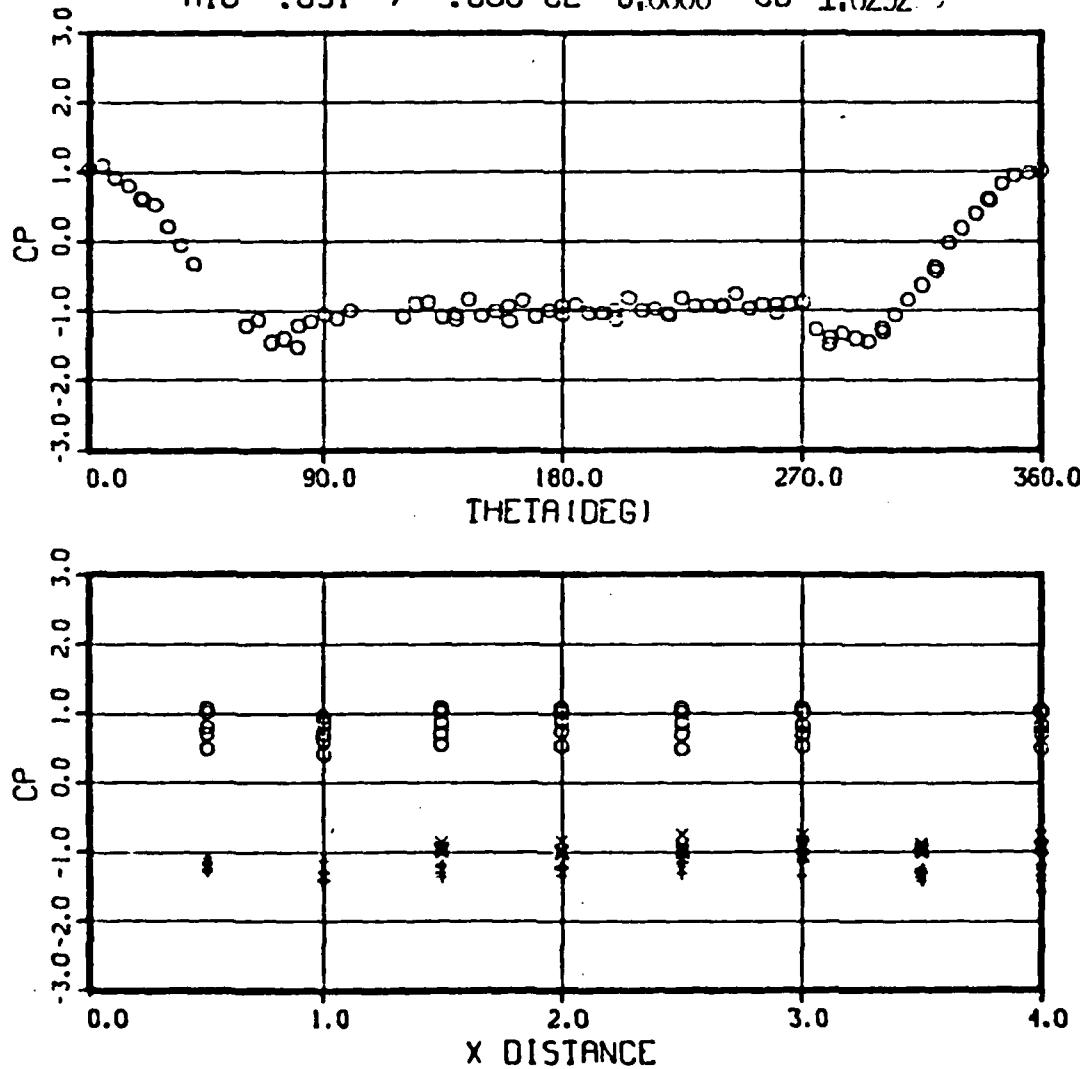
RUN 148 OIU- 44.8 +/- .00 RNDIU-1.057 +/- .001  
PIU- 1553. +/- 3.40 V1U-230.02 +/- .252  
MIU- .203 +/- .000 CL- -0.0108 CD- 1.1179



CP VALUES ALONG LONGITUDINAL RAYS AT  
POLAR ANGLE OF 4DEG-0 64DEG-+ 124DEG-X.  
THE 5 SETS OF POINTS AT EACH LOCATION  
CORRESPOND TO 4 ROLLS OF 5 DEG., EACH.

CYLINDER + NO. 6 MESH SCREEN

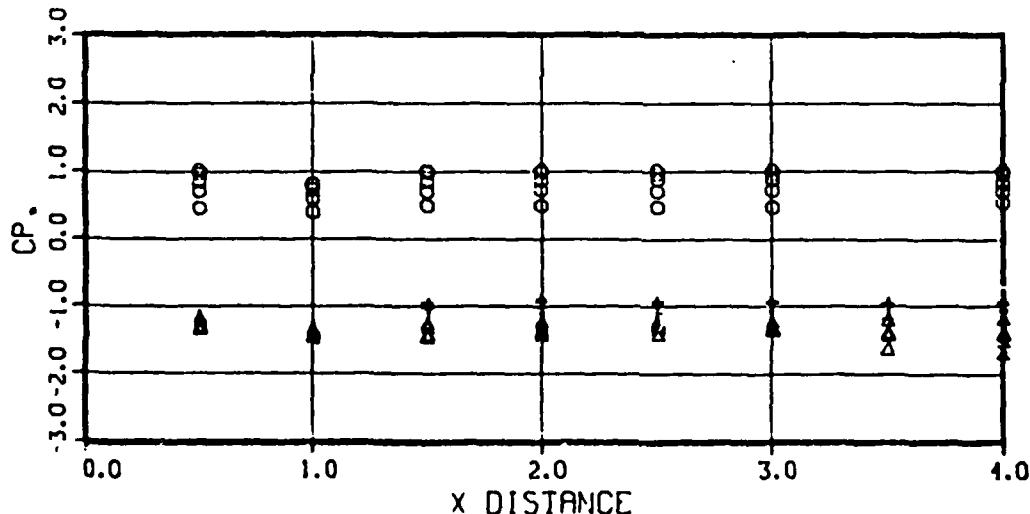
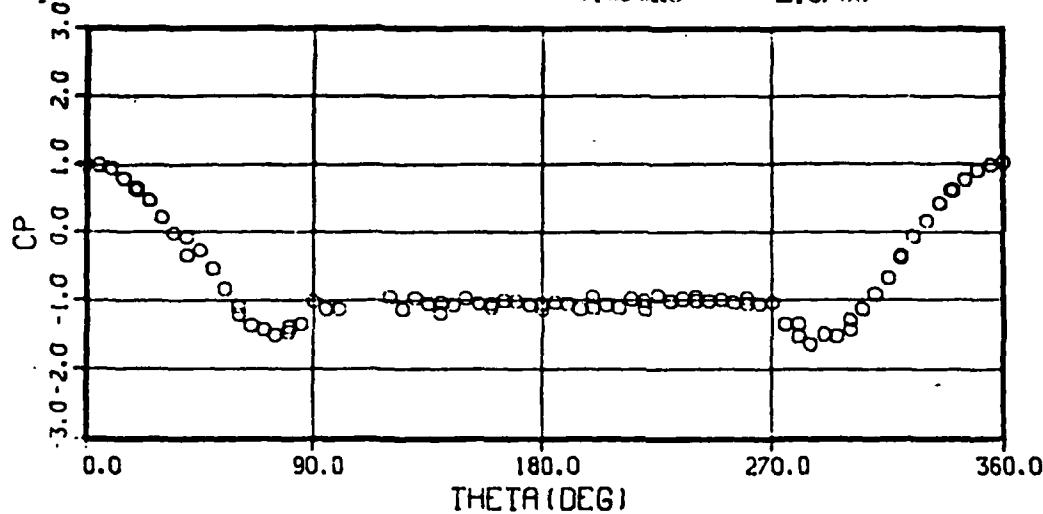
RUN 150 QIU- 7.0 +/- .00 RNDIU-1.092 +/- .002  
PIU-10321. +/- 1.40 VIU- 34.94 +/- .018  
MIU- .031 +/- .000 CL- 0.0006 CD-1.0292



CP VALUES ALONG LONGITUDINAL RAYS AT  
POLAR ANGLE OF 40DEG-0 64DEG-+ 124DEG-X.  
THE 5 SETS OF POINTS AT EACH LOCATION  
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

CYLINDER • NO. 6 MESH SCREEN

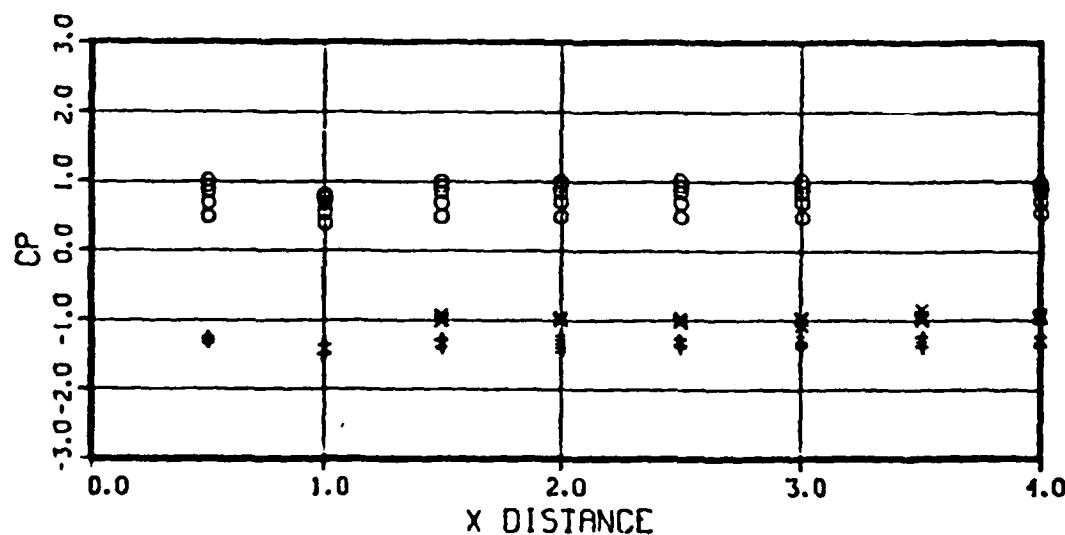
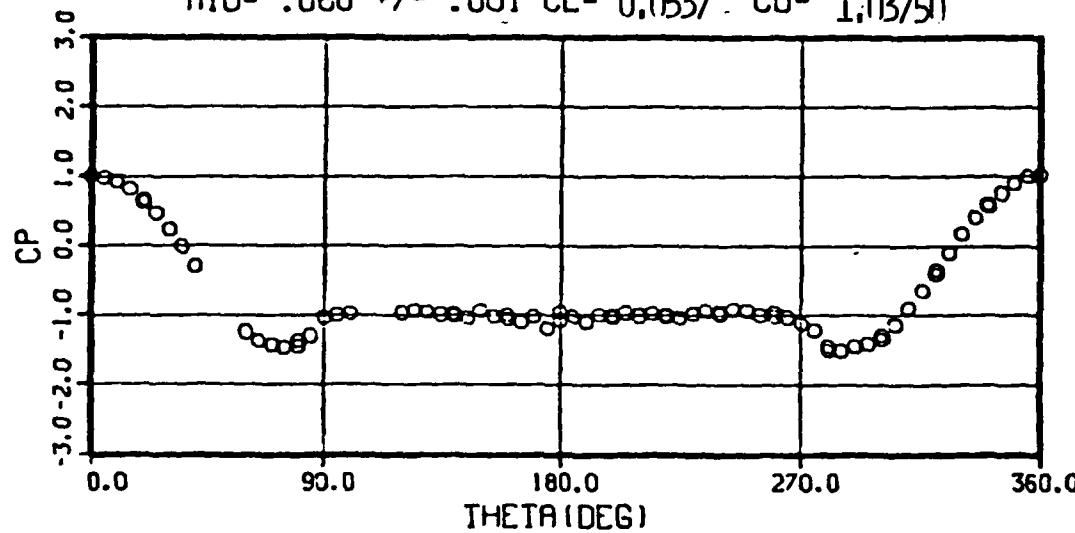
RUN 151 OIU- 11.7 +/- .00 RNDIU-1.421 +/- .001  
 PIU-10316. +/- .00 VIU- 45.24 +/- .016  
 MIU- .040 +/- .000 CL- 0.03620 CD- 1.0700



CP VALUES ALONG LONGITUDINAL RAYS AT  
 POLAR ANGLE OF 4DEG-0 64DEG-+ 124DEG-X.  
 THE 5 SETS OF POINTS AT EACH LOCATION  
 CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

CYLINDER + NO. 6 MESH SCREEN

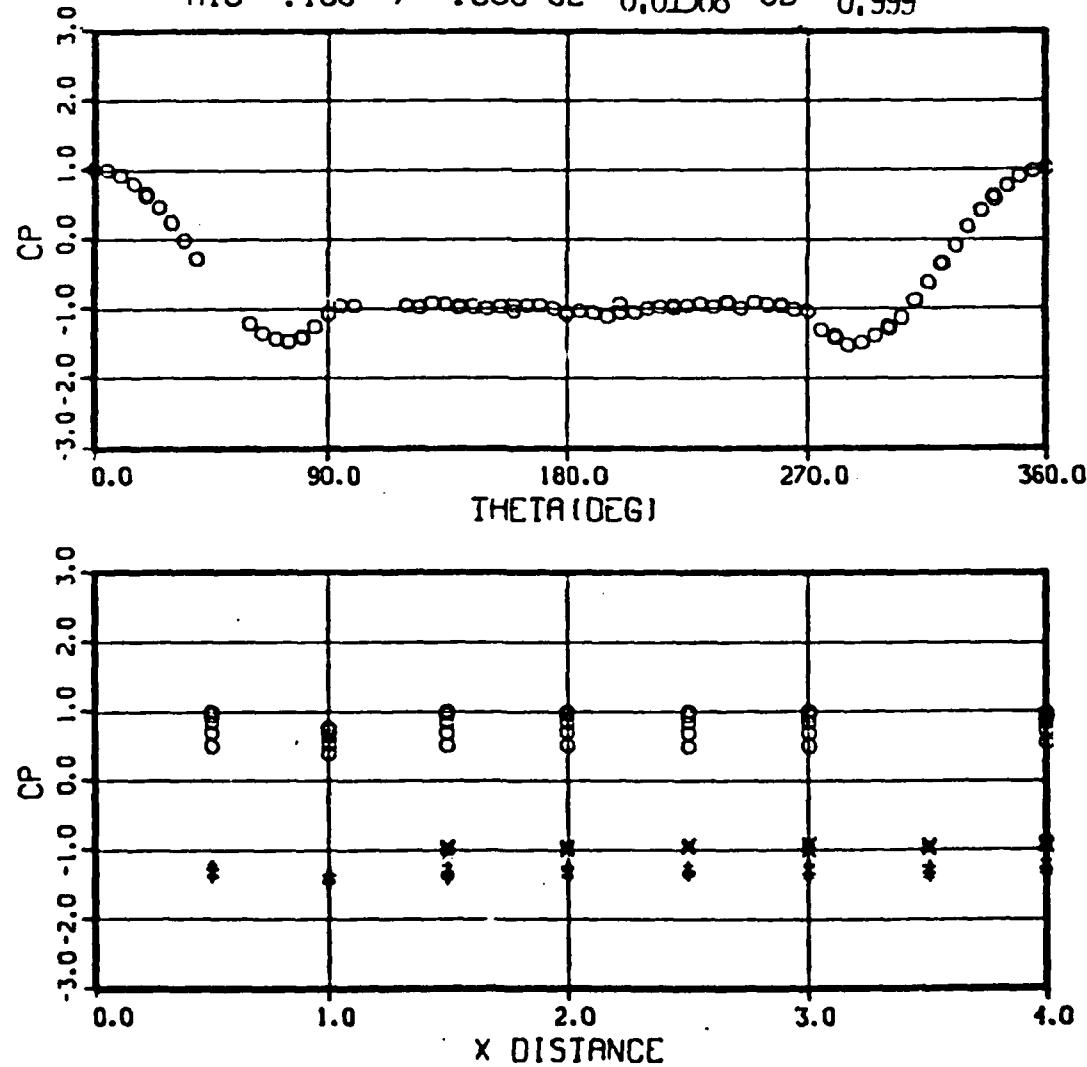
RUN 152 OIU- 26.1 +/- .28 RNDIU-2.127 +/- .013  
PIU-10300. +/- 1.00 VIU- 67.56 +/- .434  
MIU- .060 +/- .001 CL- 0.0537 CO- 1.03750



CP VALUES ALONG LONGITUDINAL RAYS AT  
POLAR ANGLE OF 4DEG-0 64DEG-+ 124DEG-X.  
THE 5 SETS OF POINTS AT EACH LOCATION  
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

CYLINDER + NO. 6 MESH SCREEN

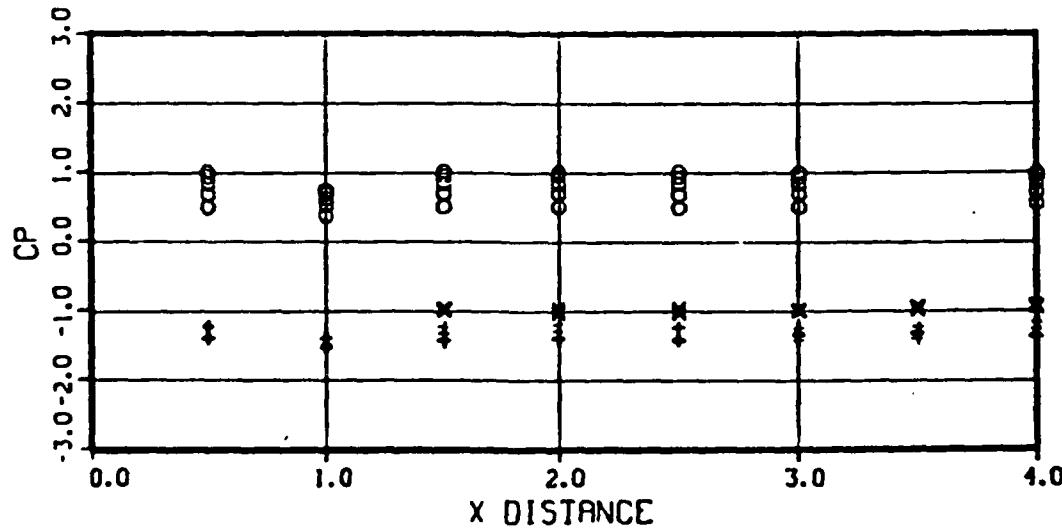
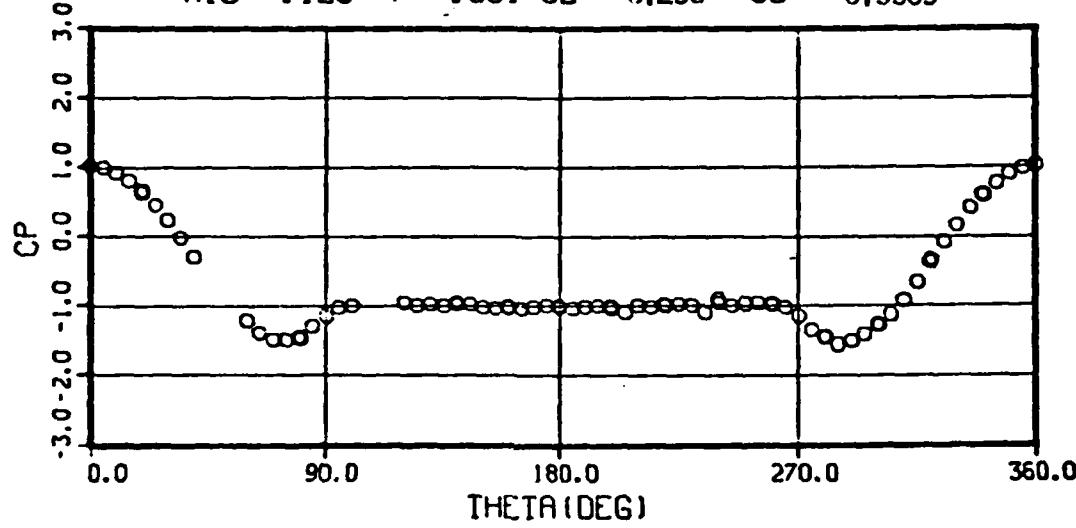
RUN 153 OIU- 71.5 +/- .22 RNDIU-3.515 +/- .007  
PIU-10254. +/- 2.00 VIU-112.01 +/- .186  
MIU- .100 +/- .000 CL- 0.01568 CD- 0.999



CP VALUES ALONG LONGITUDINAL RAYS AT  
POLAR ANGLE OF 4DEG-0 64DEG-+ 124DEG-X.  
THE 5 SETS OF POINTS AT EACH LOCATION  
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

CYLINDER + NO. 6 MESH SCREEN

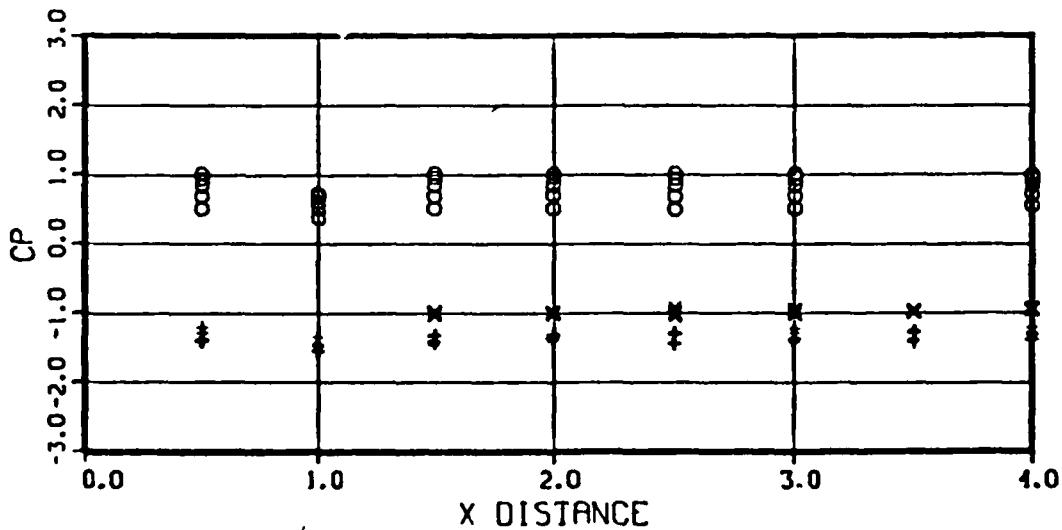
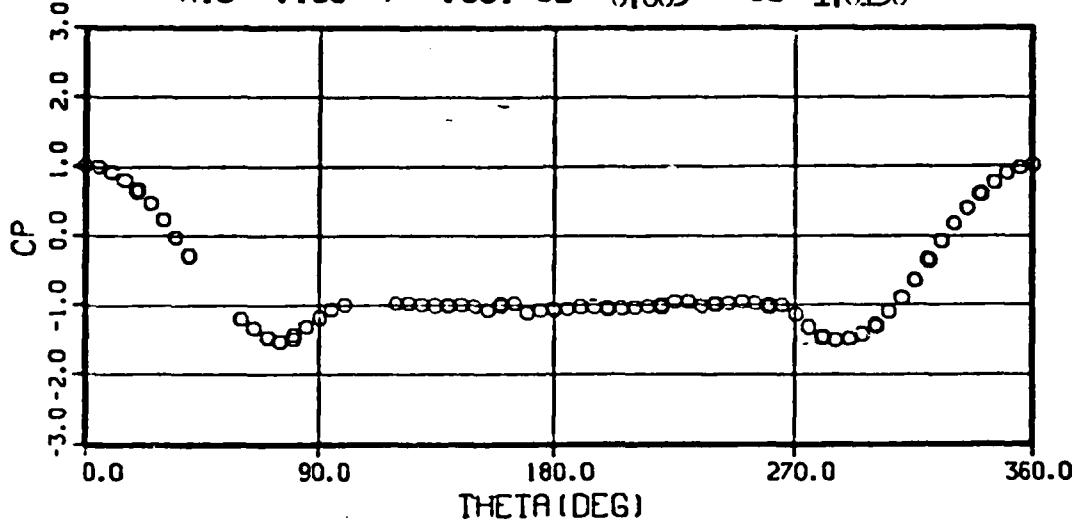
RUN 154 C1U-103.1 +/- .90 RND1U-4.209 +/- .021  
P1U-10226. +/- 2.20 V1U-134.77 +/- .566  
MIU- .120 +/- .001 CL- -0.296 CD- 0.9909



CP VALUES ALONG LONGITUDINAL RAYS AT  
POLAR ANGLE OF 40DEG-0 64DEG-+ 124DEG-X.  
THE 5 SETS OF POINTS AT EACH LOCATION  
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

CYLINDER + NO. 6 MESH SCREEN

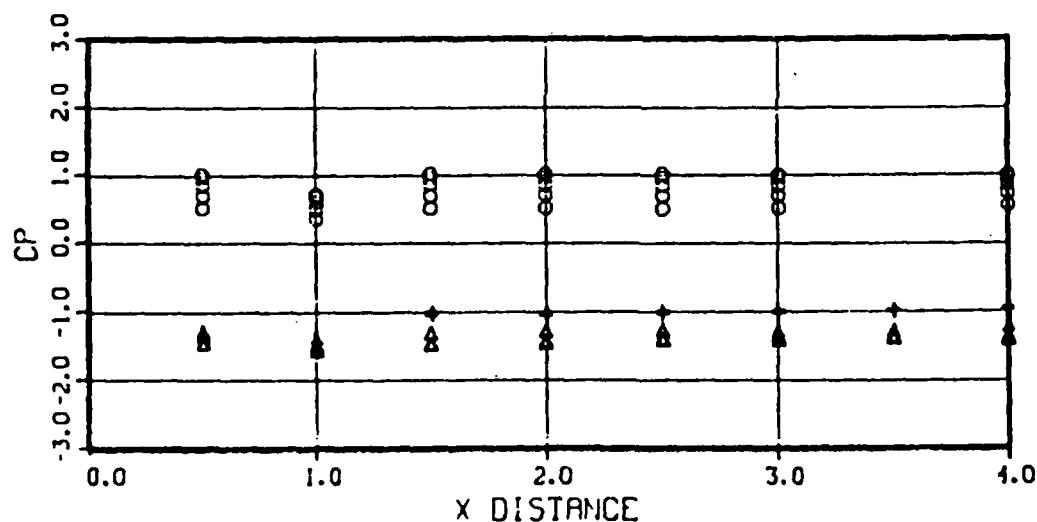
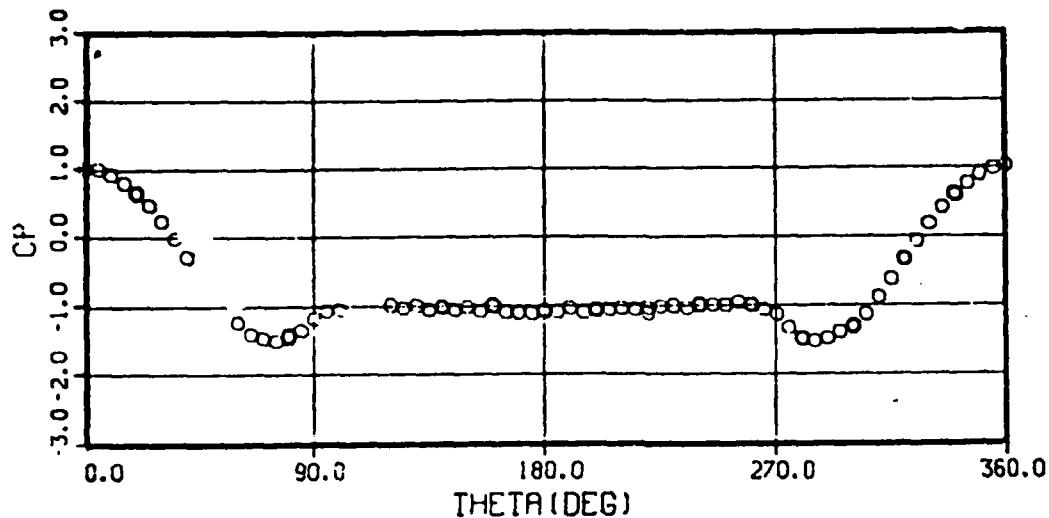
RUN 155 OIU-160.7 +/- .86 RNDIU-5.218 +/- .017  
 PIU-10164. +/- 1.60 VIU-169.06 +/- .416  
 MIU- .150 +/- .001 CL- 0.003 CD- 1.0156



CP VALUES ALONG LONGITUDINAL RAYS AT  
 POLAR ANGLE OF 4DEG-0 64DEG-+ 124DEG-X.  
 THE 5 SETS OF POINTS AT EACH LOCATION  
 CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

CYLINDER + NO. 6 MESH SCREEN

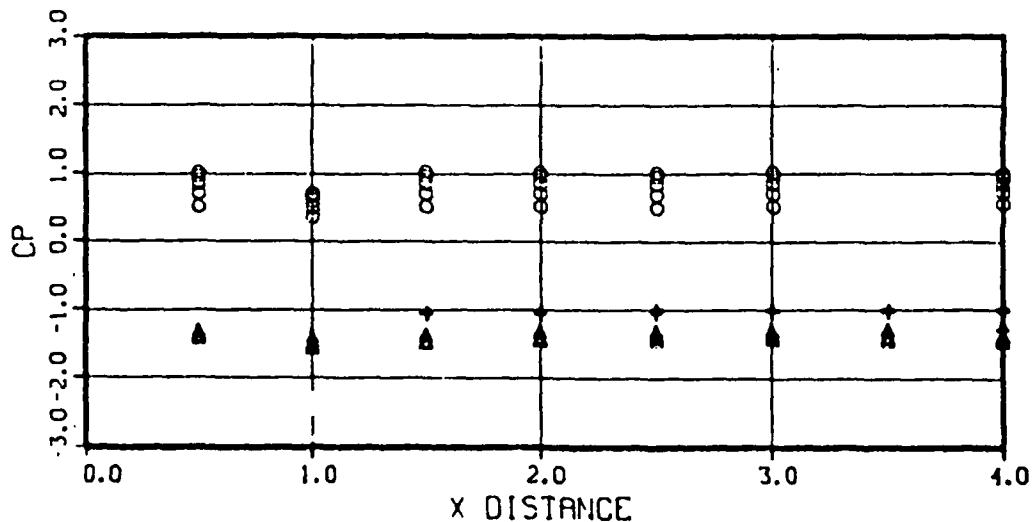
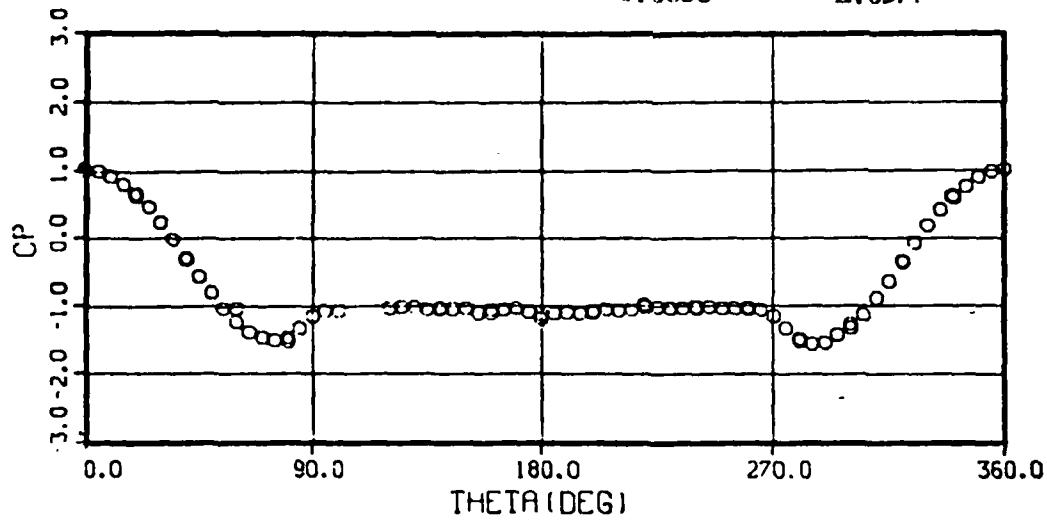
RUN 156 O1U-227.4 +/- .84 RNDIU-6.136 +/- .021  
PIU-10093. +/- 6.20 VIU-202.39 +/- .298  
MIU- .179 +/- .001 CL- 0.0003 CD- 1.0474



CP VALUES ALONG LONGITUDINAL RAYS AT  
POLAR ANGLE OF 4DEG-0 64DEG-+ 124DEG-X.  
THE 5 SETS OF POINTS AT EACH LOCATION  
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

CYLINDER + NO. 6 MESH SCREEN

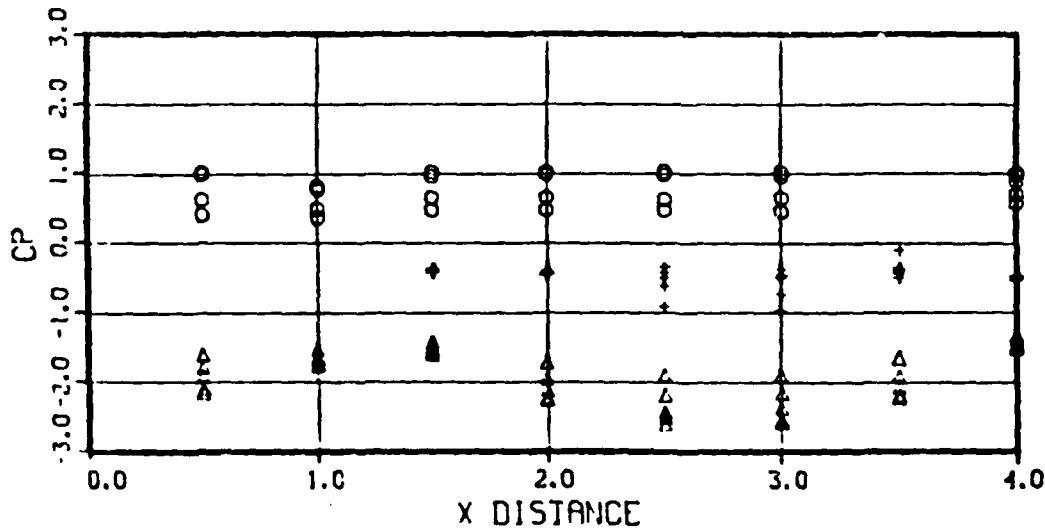
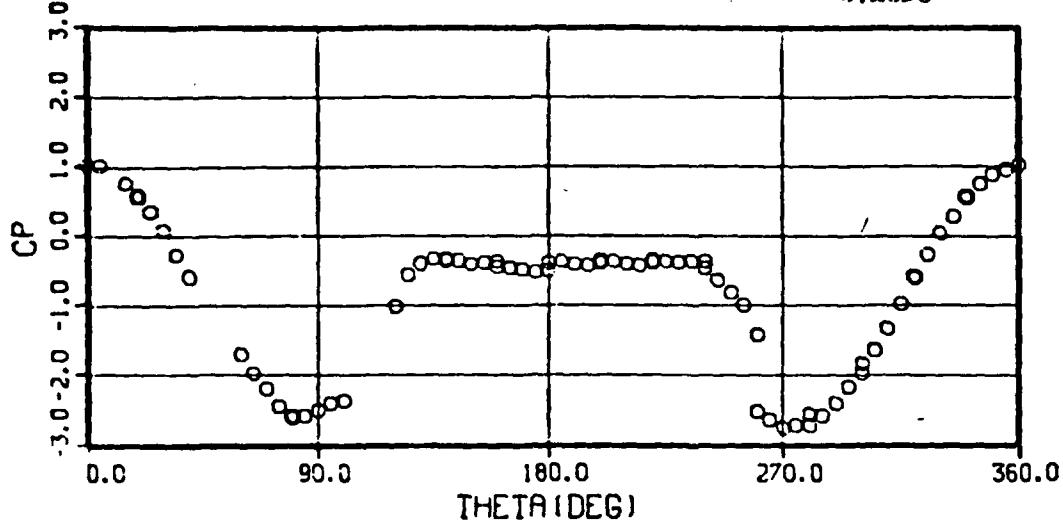
RUN 157 OIU-281.3 +/- .48 RNDIU-6.710 +/- .014  
PIU-10044. +/- 3.80 VIU-226.99 +/- .218  
MIU- .200 +/- .000 CL- 0.0096 CD- 1.0579



CP VALUES ALONG LONGITUDINAL RAYS AT  
POLAR ANGLE OF 4DEG-0 64DEG--> 124DEG-X.  
THE 5 SETS OF POINTS AT EACH LOCATION  
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

CYLINDER + NO. 250 MESH SCREEN

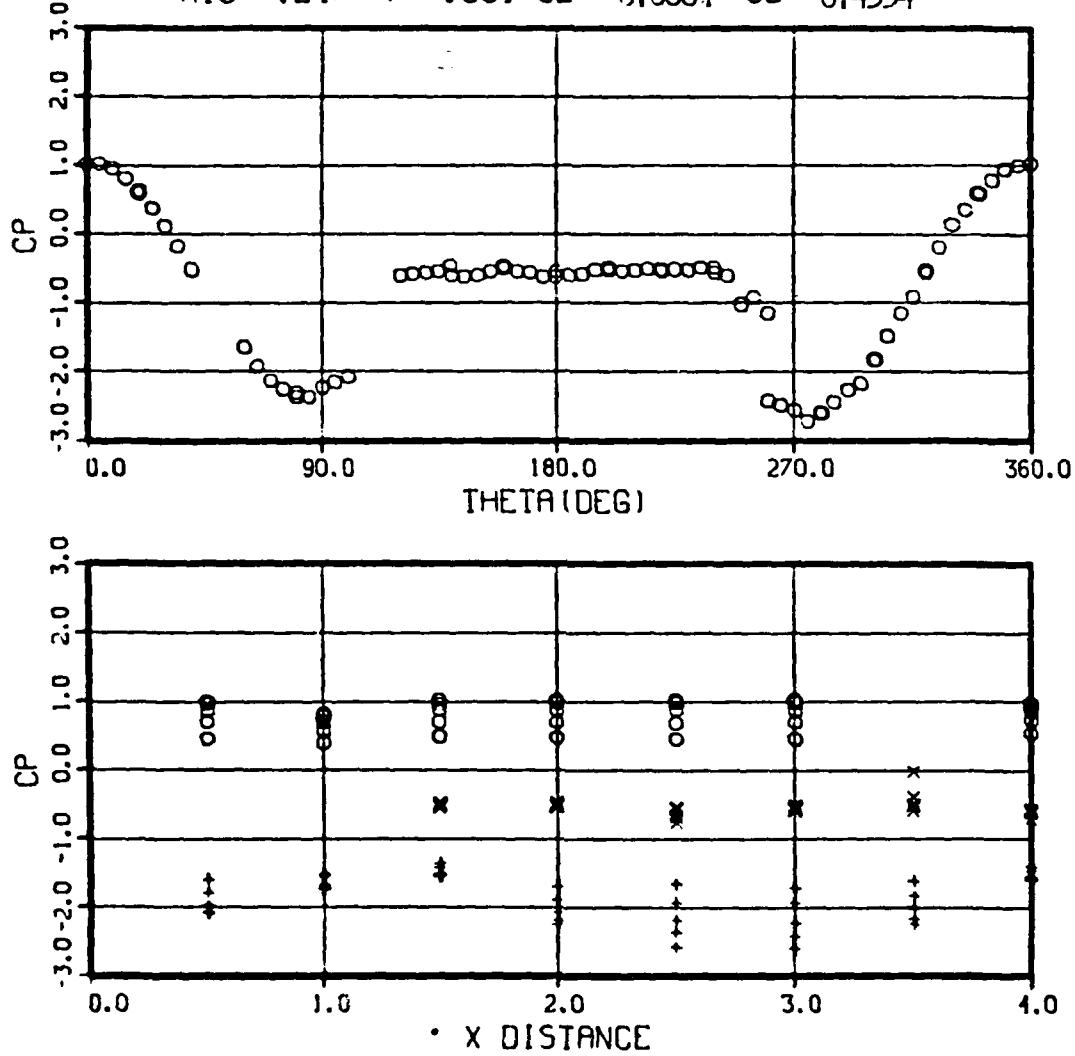
RUN 171 OIU- 19.7 +/- .08 RNDIU- .408 +/- .002  
 PIU- 478. +/- 3.80 VIU-269.46 +/- .620  
 MIU- .242 +/- .001 CL- -0.0624 CD- 0.2856



CP VALUES ALONG LONGITUDINAL RAYS AT  
 POLAR ANGLE OF 4DEG-0 64DEG-+ 124DEG-X.  
 THE 5 SETS OF POINTS AT EACH LOCATION  
 CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

CYLINDER + NO. 250 MESH SCREEN

RUN 173 OIU- 30.7 +/- .16 RNDIU- .615 +/- .002  
 PIU- 722. +/- 3.80 VIU-276.23 +/- .426  
 MIU- .247 +/- .001 CL- 0.0884 CD- 0.4554



CP VALUES ALONG LONGITUDINAL RAYS AT  
 POLAR ANGLE OF 4DEG-0 64DEG-+ 124DEG-X.  
 THE 5 SETS OF POINTS AT EACH LOCATION  
 CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

RD-A160 351

ANALYSIS OF FLUID FLOW AT VERY HIGH REYNOLDS NUMBER  
AROUND SMOOTH & ROUGH. (U) ALABAMA A AND M UNIV NORMAL  
DEPT OF PHYSICS S S MURTY ET AL. JUL 95

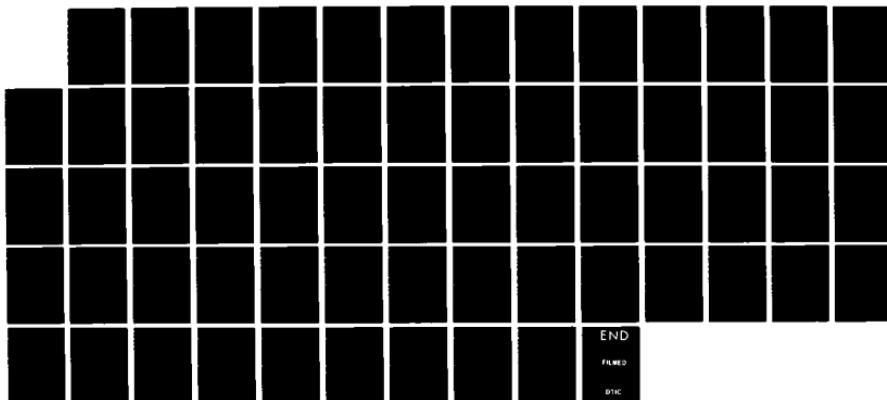
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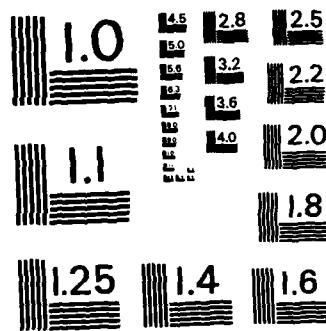
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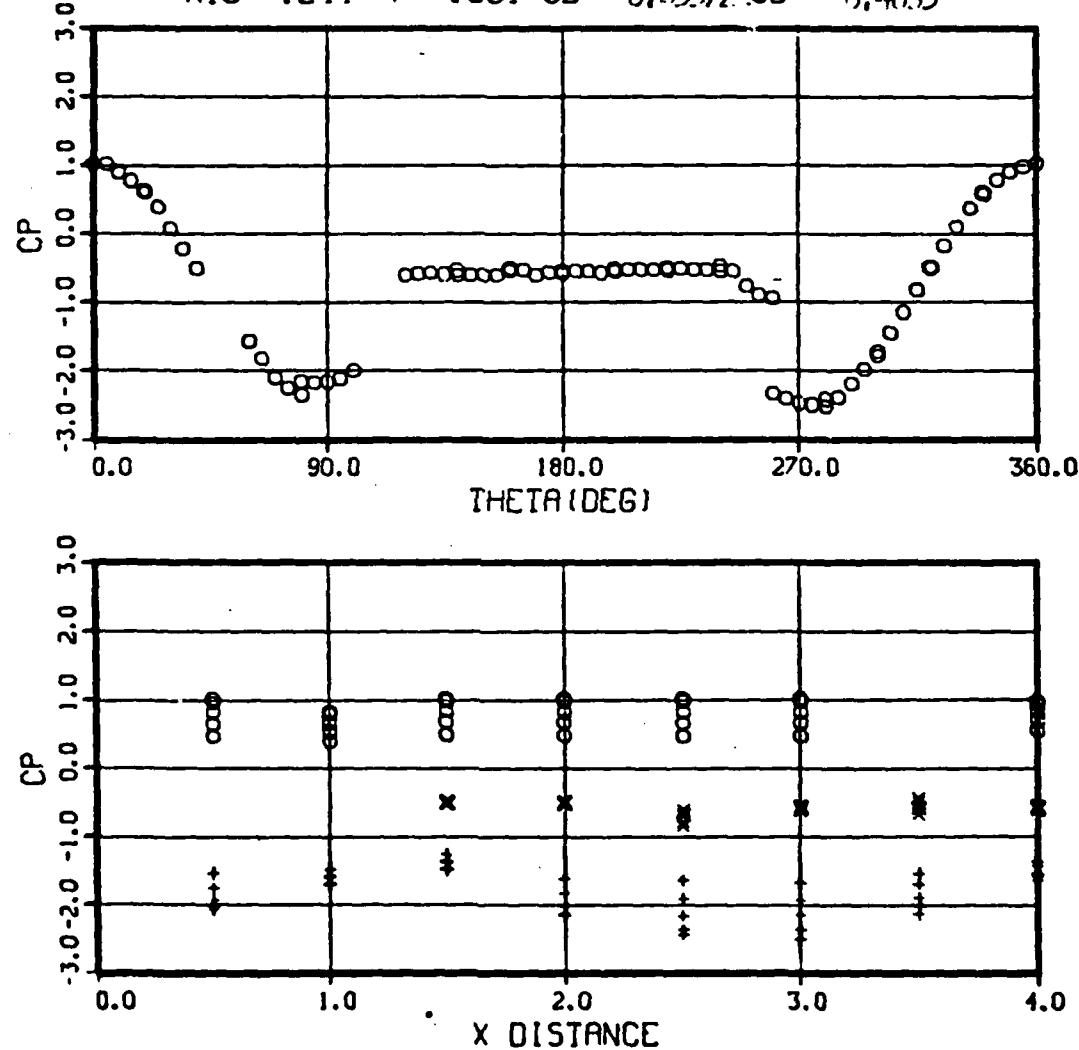
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MICROCOPY RESOLUTION TEST CHART  
NATIONAL BUREAU OF STANDARDS - 1963 - A

CYLINDER + NO. 250 MESH SCREEN

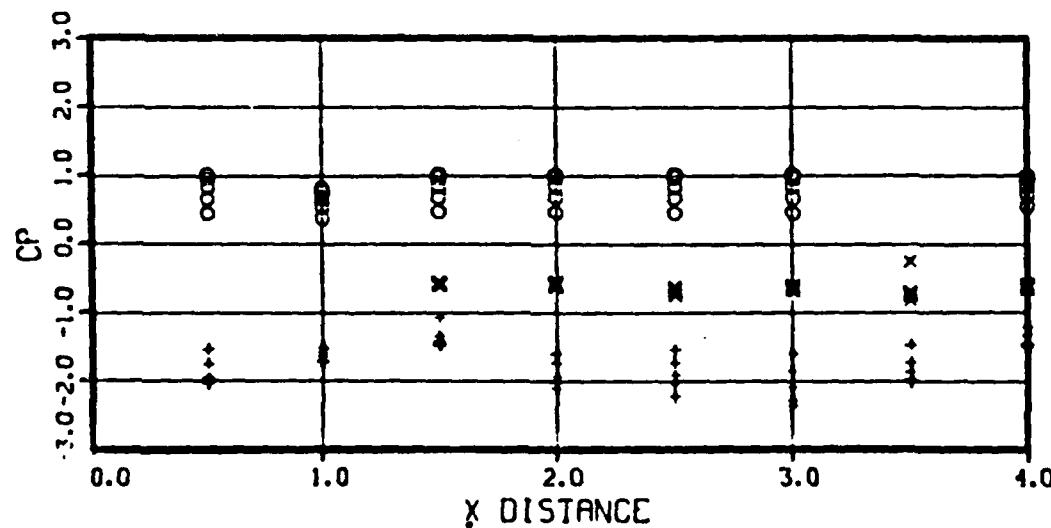
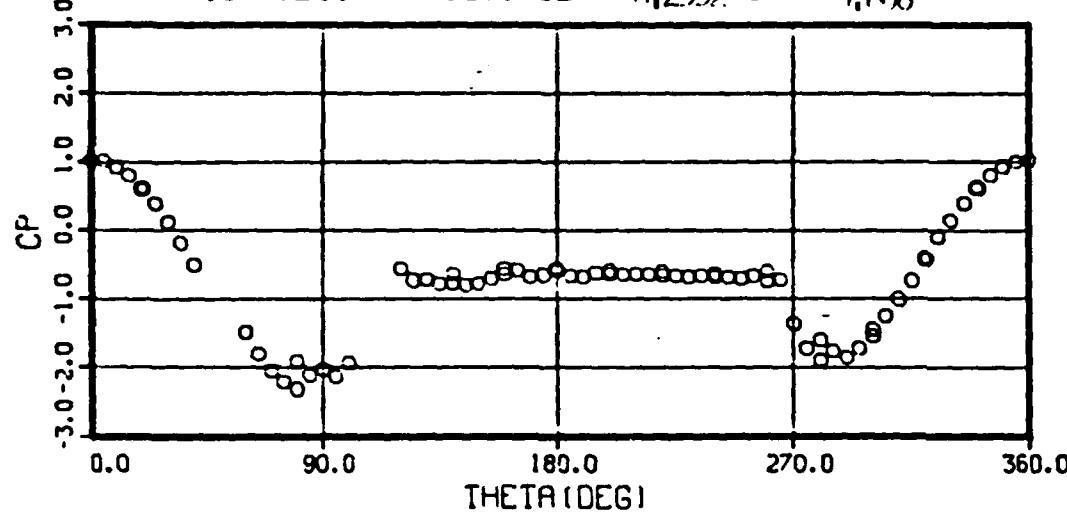
RUN 174 DIU- 35.5 +/- .14 RNDIU-.711 +/- .003  
 PIU- 848. +/- 3.80 VIU-274.39 +/- .330  
 MIU- .244 +/- .001 CL- -0.05572 CD- 0.4693



CP VALUES ALONG LONGITUDINAL RAYS AT  
 POLAR ANGLE OF 40DEG-0 64DEG-+ 124DEG-X.  
 THE 5 SETS OF POINTS AT EACH LOCATION  
 CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

CYLINDER • NO. 250 MESH SCREEN

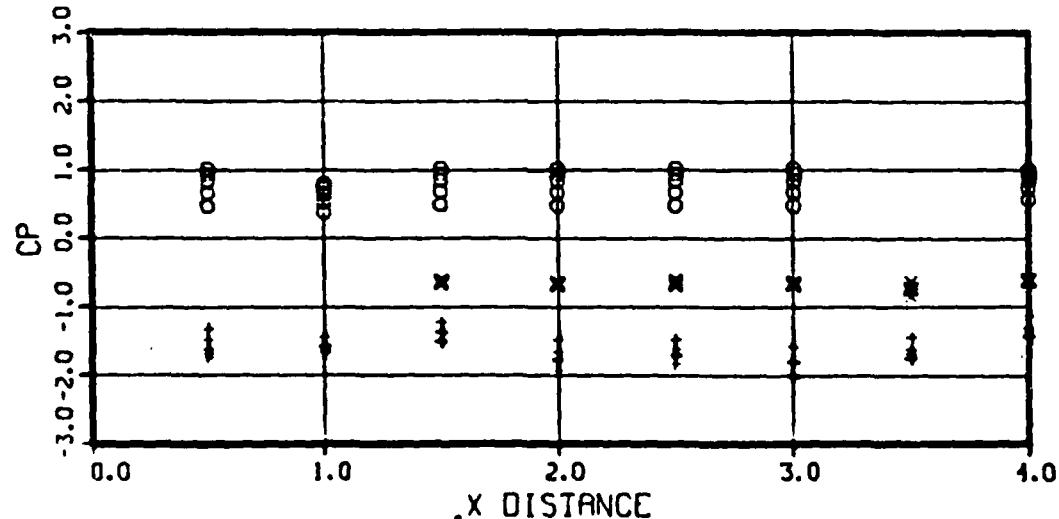
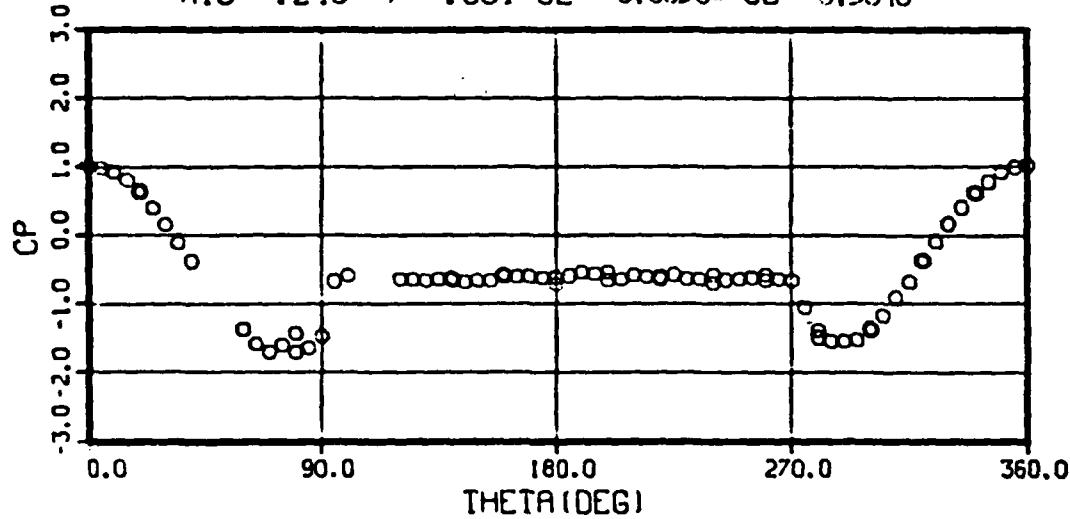
RUN 177 OIU- 51.2 +/- .30 RNDIU-1.017 +/- .004  
PIU- 1225. +/- 3.80 VIU-275.51 +/- .490  
MIU- .244 +/- .001 CL- -0.2532 CD- 0.608



CP VALUES ALONG LONGITUDINAL RAYS AT  
POLAR ANGLE OF 4DEG-0 64DEG-+ 124DEG-X.  
THE 5 SETS OF POINTS AT EACH LOCATION  
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

CYLINDER • NO. 250 MESH SCREEN

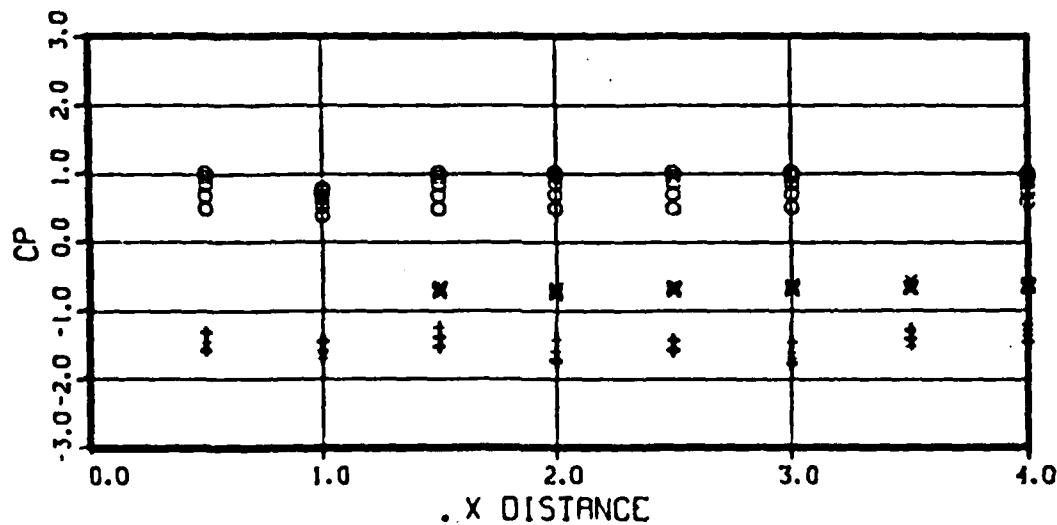
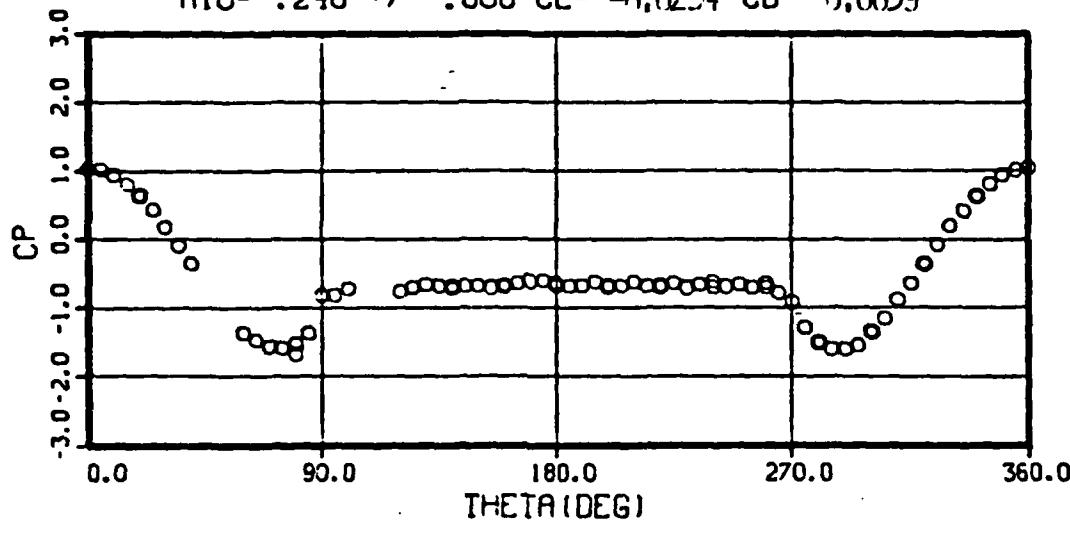
RUN 178 Q1U- 65.0 +/- .40 RND1U-1.273 +/- .006  
P1U- 1534. +/- 3.20 V1U-278.07 +/- .584  
M1U- .246 +/- .001 CL- -0.0036 CD- 0.5848



CP VALUES ALONG LONGITUDINAL RAYS AT  
POLAR ANGLE OF 4DEG-0 64DEG-+ 124DEG-X.  
THE 5 SETS OF POINTS AT EACH LOCATION  
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

CYLINDER + NO. 250 MESH SCREEN

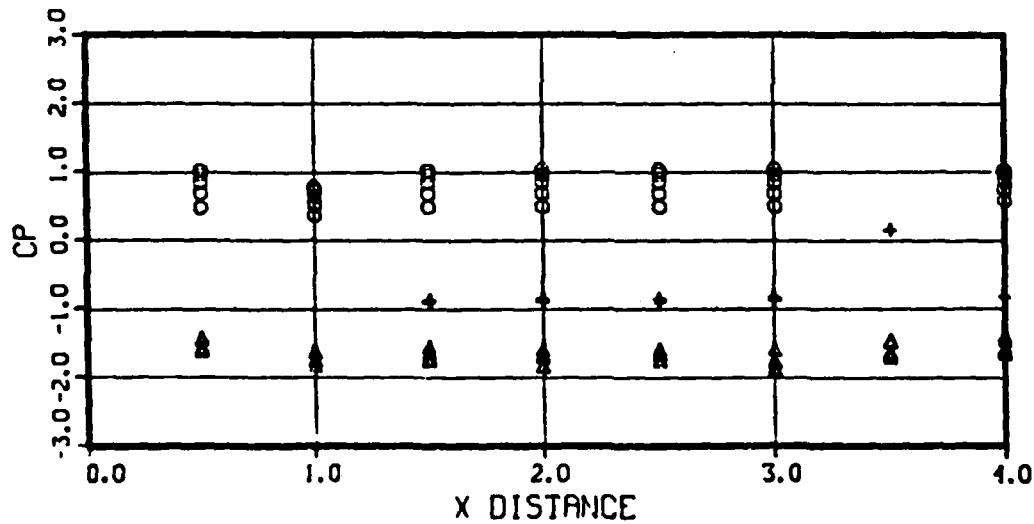
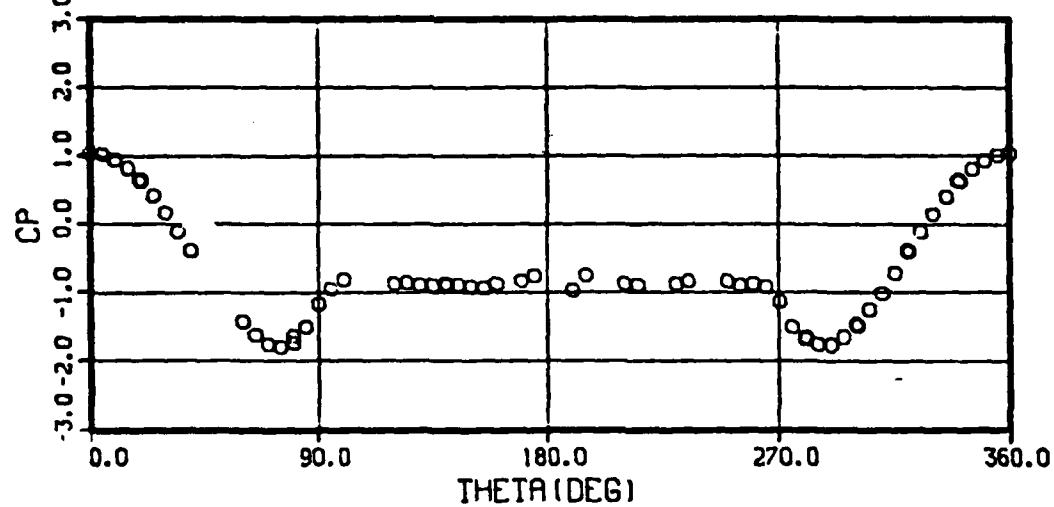
RUN 179 OIU- 78.5 +/- .15 RNDIU-1.529 +/- .001  
PIU- 1854. +/- 3.40 VIU-278.72 +/- .498  
MIU- .246 +/- .000 CL- -.0294 CD- 0.6639



CP VALUES ALONG LONGITUDINAL RAYS AT  
POLAR ANGLE OF 40DEG-0 64DEG-+ 124DEG-X.  
THE 5 SETS OF POINTS AT EACH LOCATION  
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

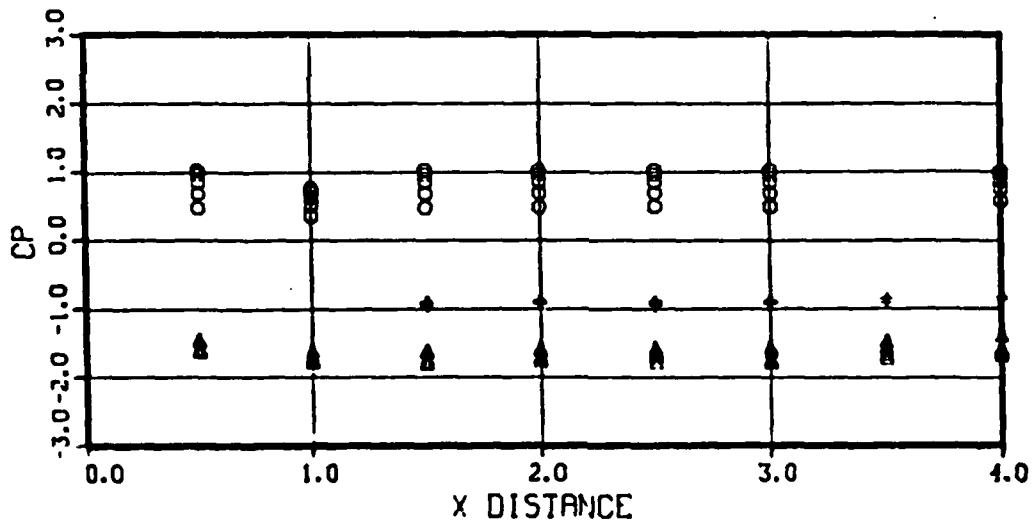
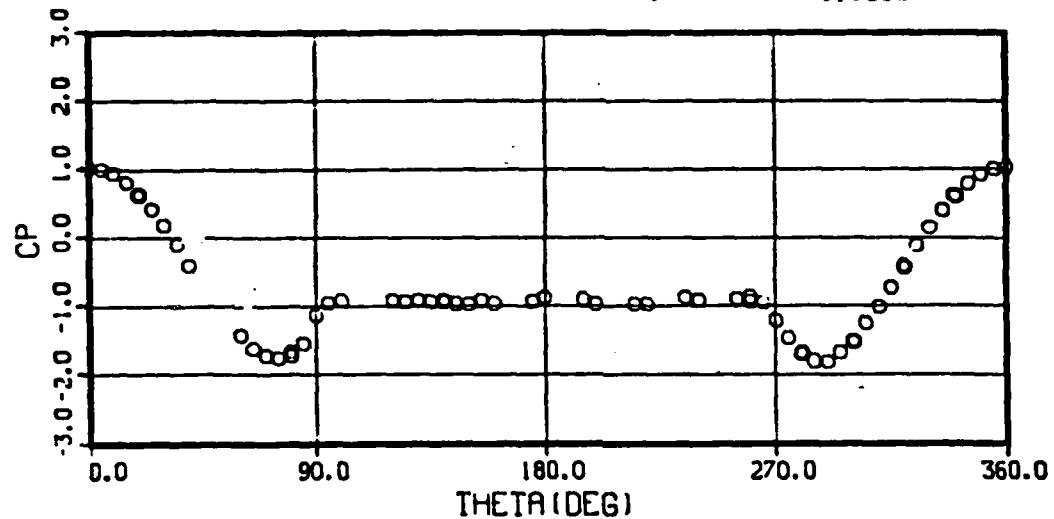
CYLINDER + NO. 250 MESH SCREEN

RUN 181 OIU-102.9 +/- .68 RNDIU-2.052 +/- .008  
PIU- 2423. +/- 8.80 VIU-276.28 +/- .968  
MIU- .246 +/- .001 CL- -0.0262 CD- 0.8219



CP VALUES ALONG LONGITUDINAL RAYS AT  
POLAR ANGLE OF 4DEG-0 64DEG-+ 124DEG-X.  
THE 5 SETS OF POINTS AT EACH LOCATION  
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

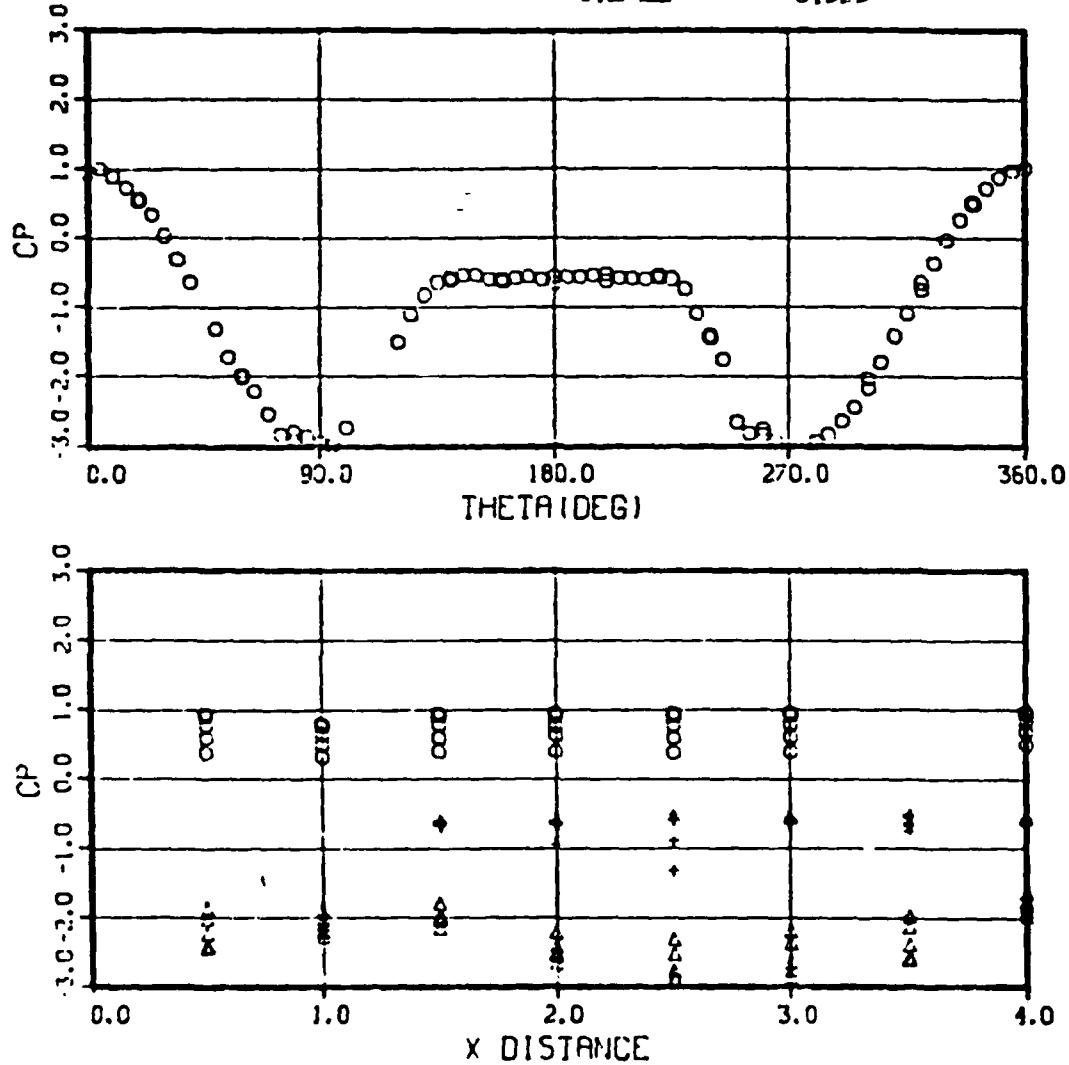
CYLINDER + NO. 250 MESH SCREEN  
 RUN 182 QIU-133.2 +/- .64 RNDIU-2.578 +/- .005  
 PIU- 3143. +/- 7.20 VIU-279.45 +/- .578  
 MIU- .246 +/- .000 CL- -0.026 CD- 0.8685



CP VALUES ALONG LONGITUDINAL RAYS AT  
 POLAR ANGLE OF 40DEG-0 64DEG-+ 124DEG-X.  
 THE 5 SETS OF POINTS AT EACH LOCATION  
 CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

CYLINDER • NO. 250 MESH SCREEN

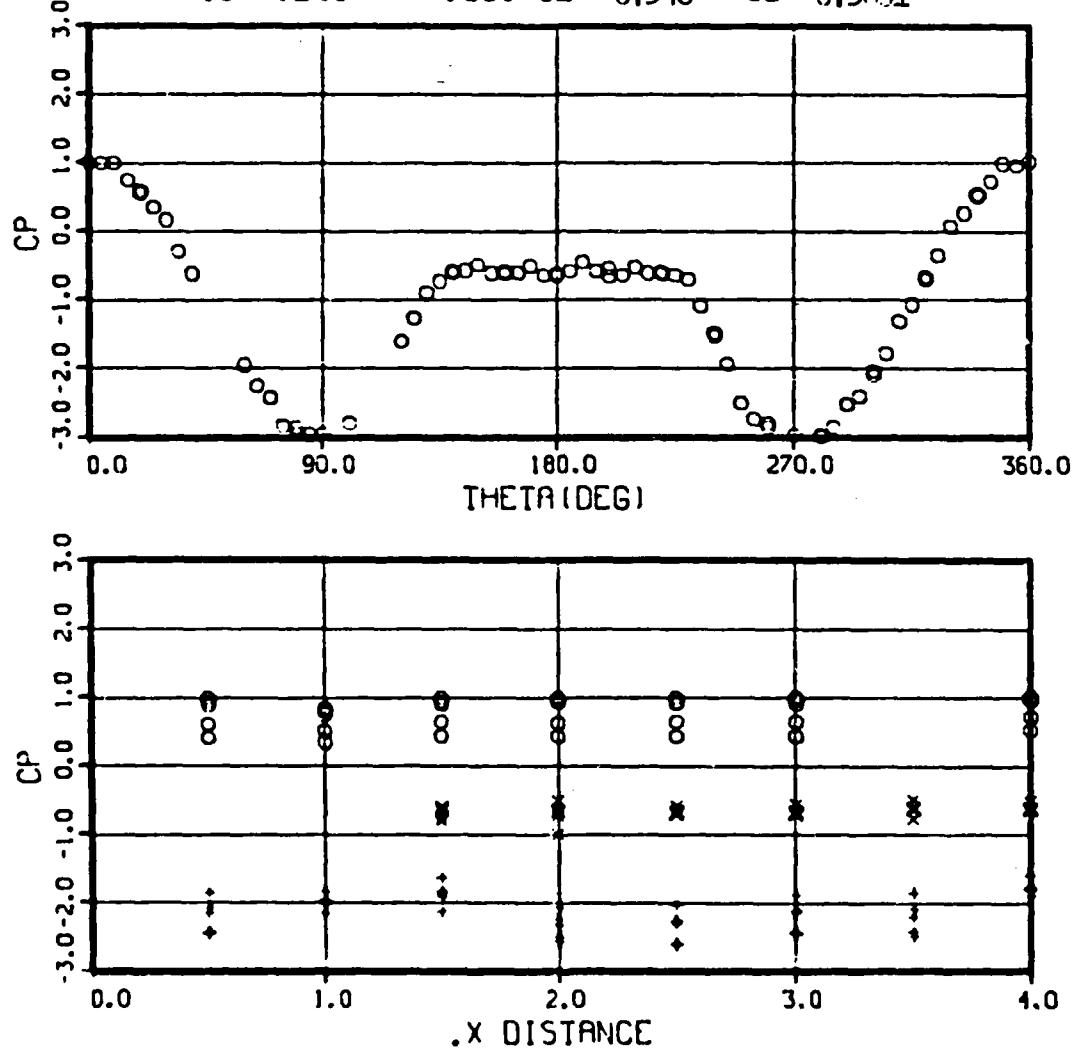
RUN 188 OIU- 20.1 +/- .82 RNDIU- .421 +/- .009  
 PIU- 501. +/- 4.00 VIU-266.32 +/- 4.716  
 MIU- .239 +/- .004 CL- 0.1021 CD- 0.523



CP VALUES ALONG LONGITUDINAL RAYS AT  
 POLAR ANGLE OF 4DEG-0 64DEG-+ 124DEG-X.  
 THE 5 SETS OF POINTS AT EACH LOCATION  
 CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

CYLINDER • NO. 250 MESH SCREEN

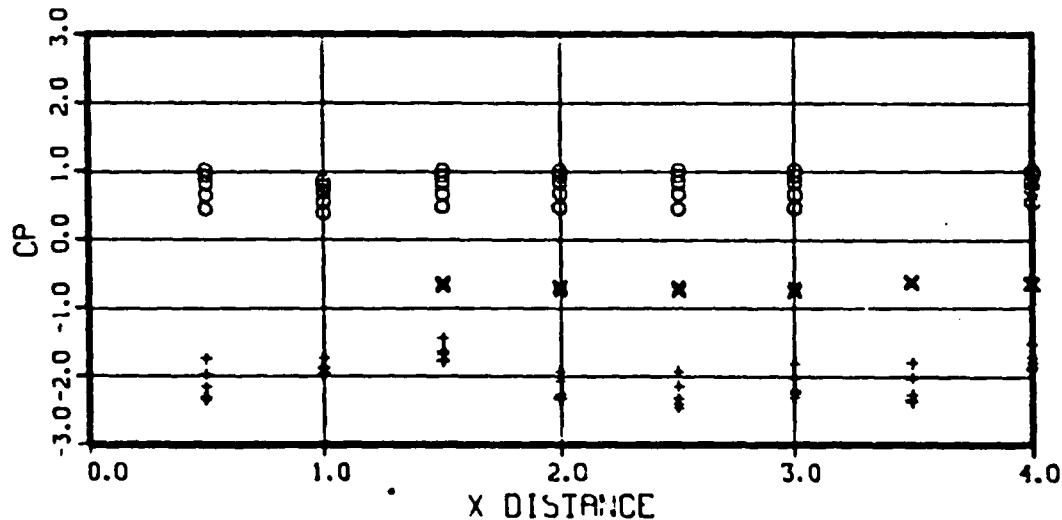
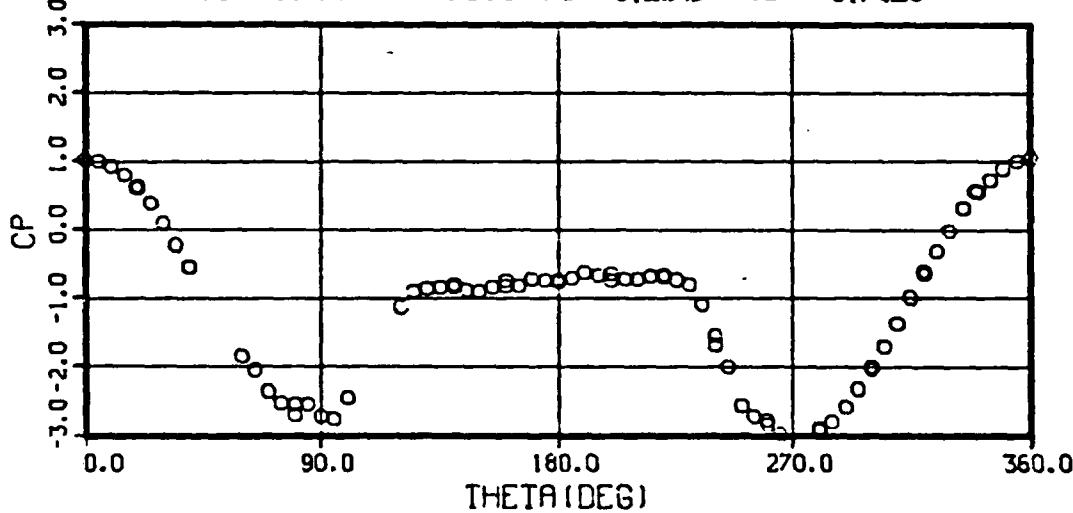
RUN 189 O1U- 25.0 +/- .40 RNDIU- .509 +/- .006  
 PIU- 604. +/- 4.00 VIU-272.05 +/- 1.488  
 MIU- .243 +/- .001 CL- 0.548 CD- 0.5091



CP VALUES ALONG LONGITUDINAL RAYS AT  
 POLAR ANGLE OF 4DEG-C 64DEG-+ 124DEG-X.  
 THE 5 SETS OF POINTS AT EACH LOCATION  
 CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

CYLINDER + NO. 250 MESH SCREEN

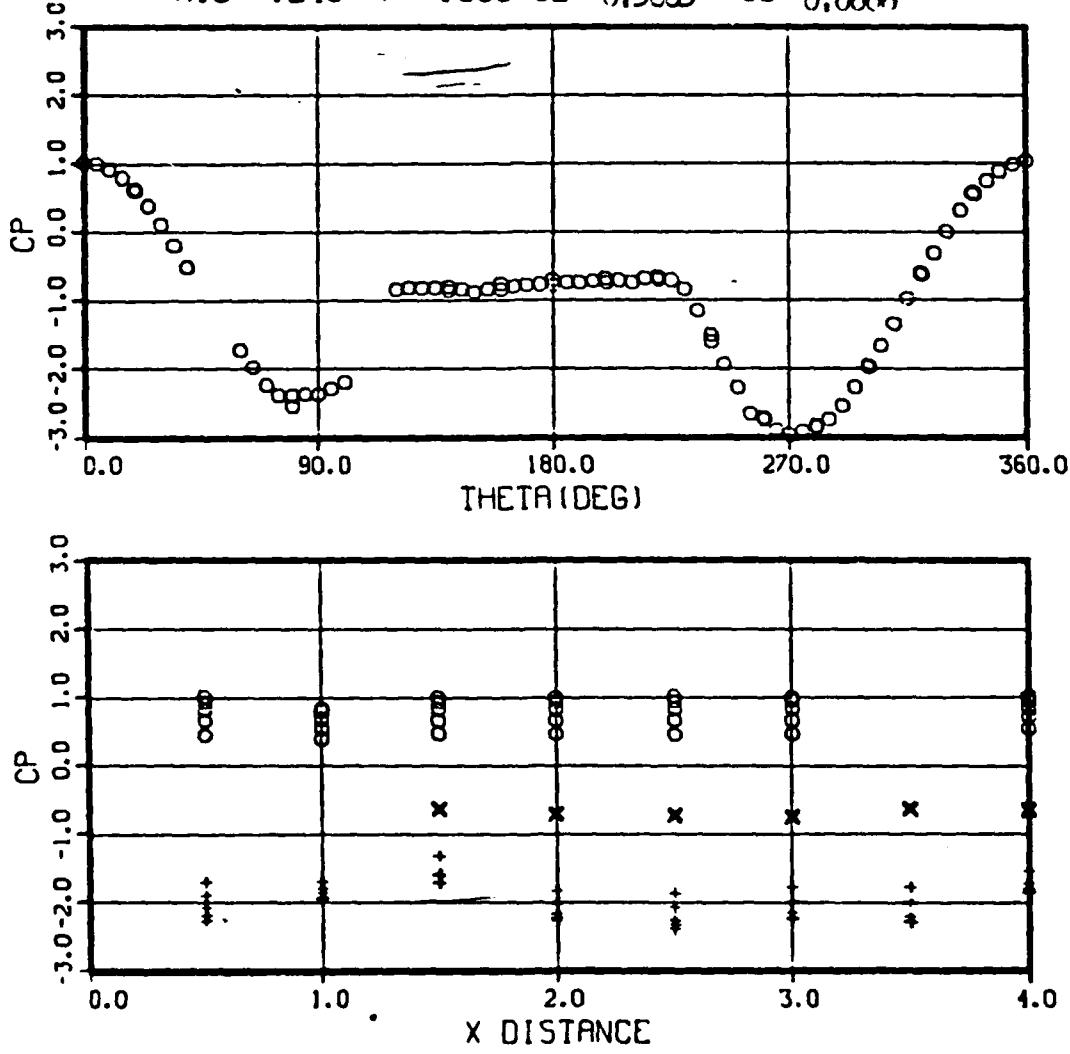
RUN 193 D1U- 36.4 +/- .25 RND1U- .721 +/- .004  
 PIU- 858. +/- 4.80 VIU-277.10 +/- .536  
 MIU- .246 +/- .001 CL- 0.2045 CD- 0.7018



CP VALUES ALONG LONGITUDINAL RAYS AT  
 POLAR ANGLE OF 40DEG-O 64DEG--+ 124DEG-X.  
 THE 5 SETS OF POINTS AT EACH LOCATION  
 CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

CYLINDER + NO. 250 MESH SCREEN

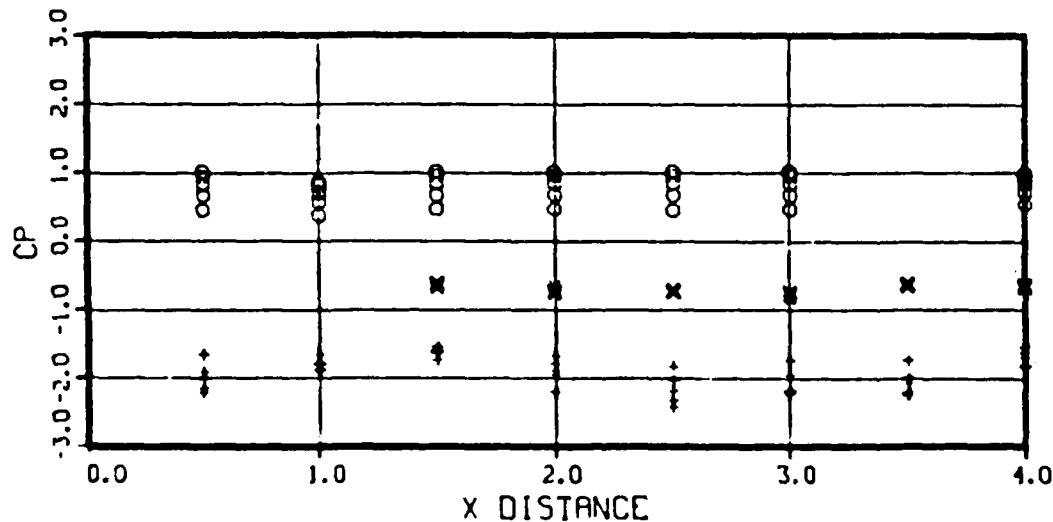
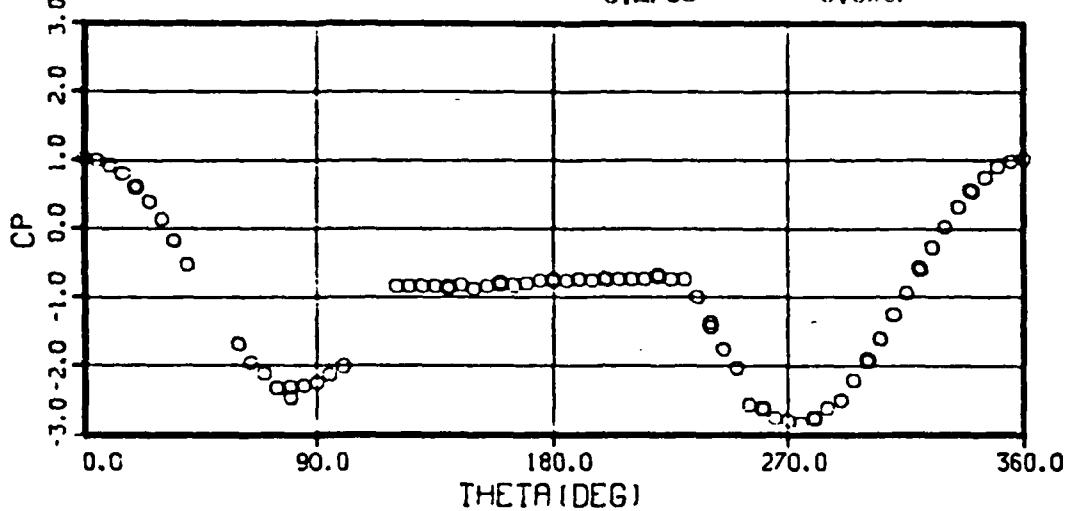
RUN 194 O1U- 41.7 +/- .18 RNDIU- .823 +/- .004  
 P1U- 984. +/- 4.60 V1U-277.31 +/- .556  
 MIU- .246 +/- .000 CL- 0.3083 CD- 0.6858



CP VALUES ALONG LONGITUDINAL RAYS AT  
 POLAR ANGLE OF 4DEG-0 64DEG-+ 124DEG-X.  
 THE 5 SETS OF POINTS AT EACH LOCATION  
 CORRESPOND TO 5 ROLLS OF 5 DEG. EACH.

CYLINDER + NO. 250 MESH SCREEN

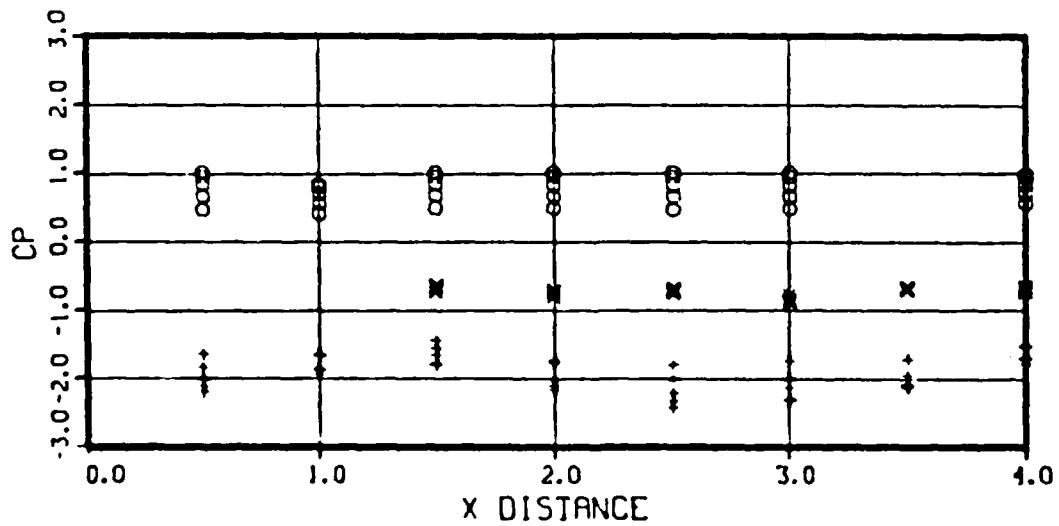
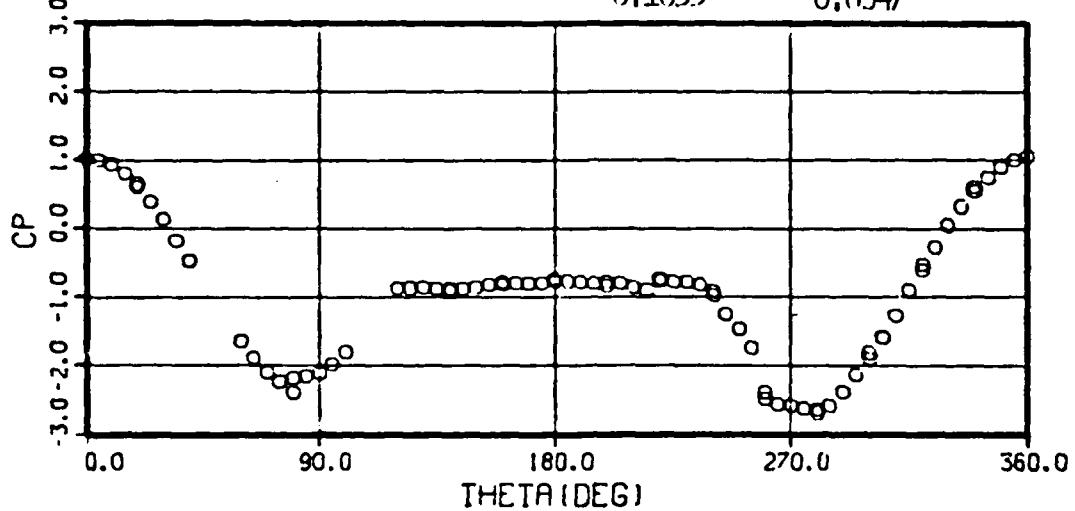
RUN 195 OIU- 47.1 +/- .20 RNDIU- .923 +/- .004  
PIU- 1103. +/- 4.00 VIU-278.65 +/- .242  
MIU- .247 +/- .000 CL- 0.2788 CD- 0.6967



CP VALUES ALONG LONGITUDINAL RAYS AT  
POLAR ANGLE OF 40DEG-0 64DEG-+ 124DEG-X.  
THE 5 SETS OF POINTS AT EACH LOCATION  
CORRESPOND TO 4 ROLLS OF 5 DFG. EACH.

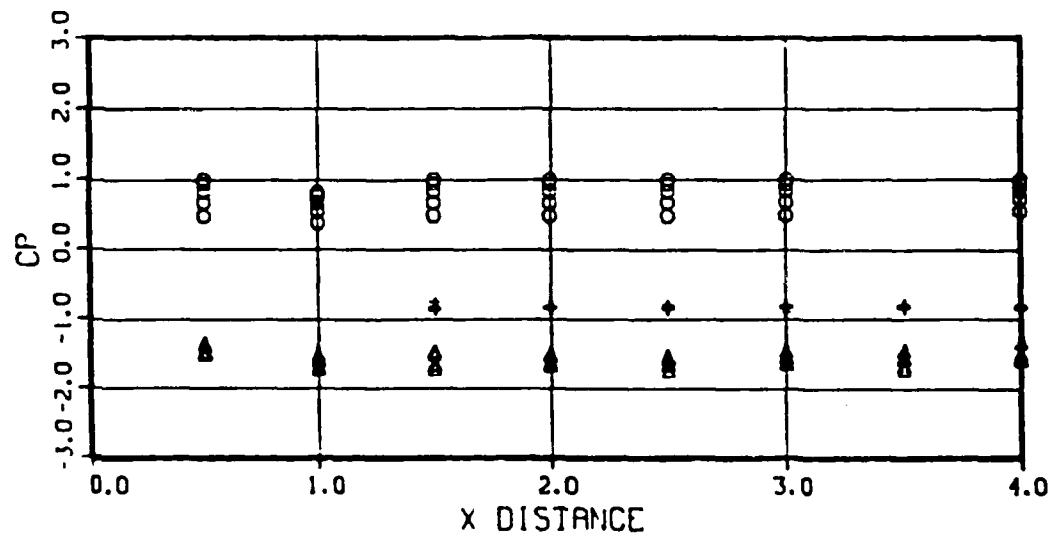
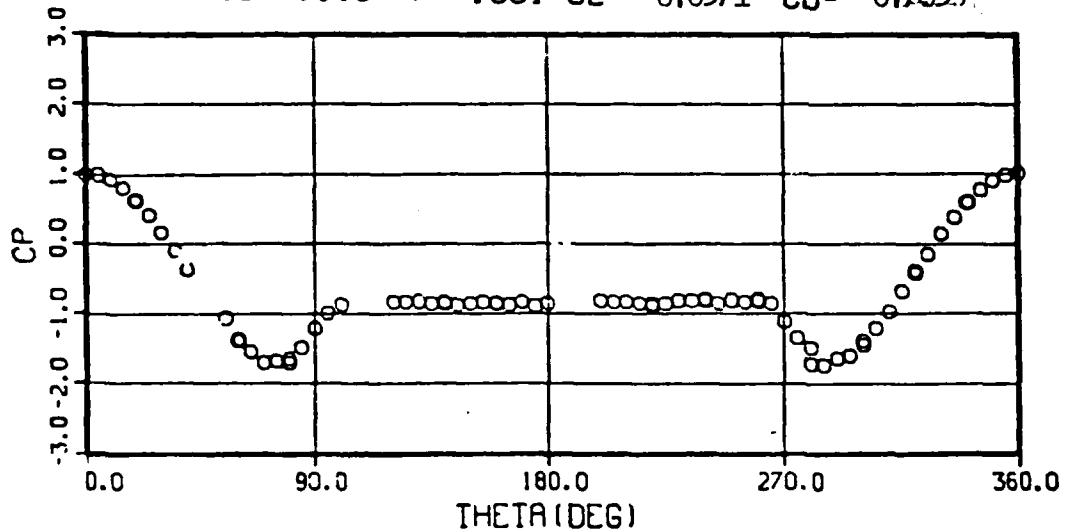
CYLINDER + NO. 250 MESH SCREEN

RUN 196 QIU- 52.3 +/- .28 RNDIU-1.025 +/- .006  
PIU- 1232. +/- 7.60 VIU-278.25 +/- .558  
MIU- .246 +/- .001 CL- 0.1653 CD- 0.6947



CP VALUES ALONG LONGITUDINAL RAYS AT  
POLAR ANGLE OF 40DEG-0 64DEG-+ 124DEG-X.  
THE 5 SETS OF POINTS AT EACH LOCATION  
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

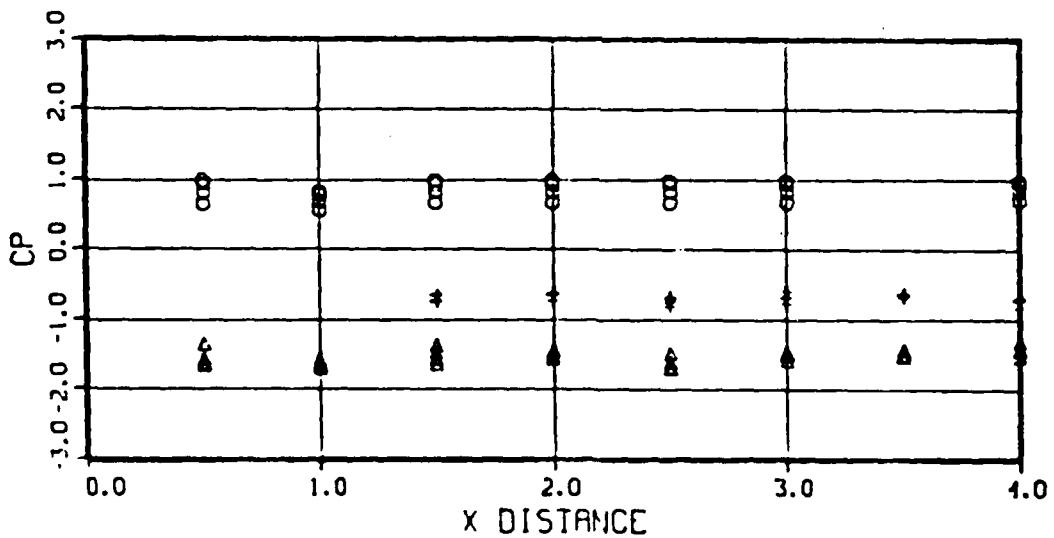
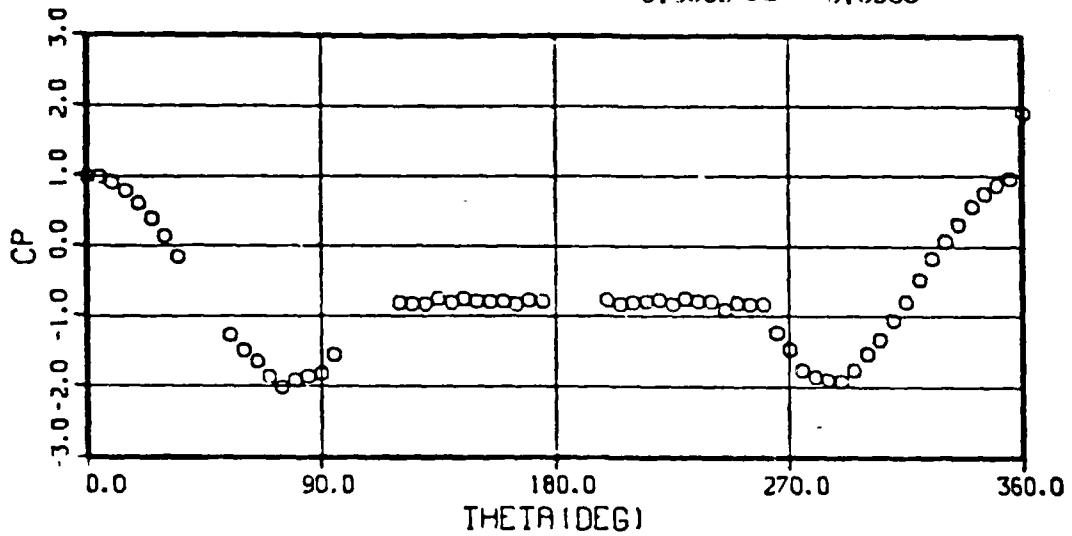
CYLINDER • NO. 250 MESH SCREEN  
 RUN 212 OIU- 71.9 +/- .34 RNDIU-2.982 +/- .008  
 PIU- 7722. +/- 5.00 VIU-130.80 +/- .292  
 MIU- .115 +/- .001 CL- -0.0371 CD- 0.7959



CP VALUES ALONG LONGITUDINAL RAYS AT  
 POLAR ANGLE OF 4DEG-0 64DEG-+ 124DEG-X.  
 THE 5 SETS OF POINTS AT EACH LOCATION  
 CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

CYLINDER + NO. 250 MESH SCREEN

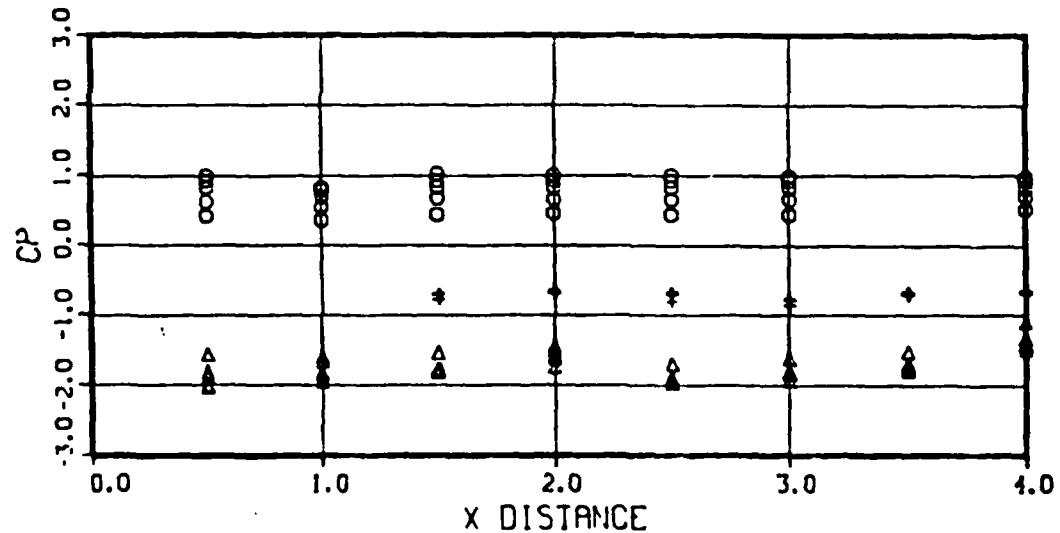
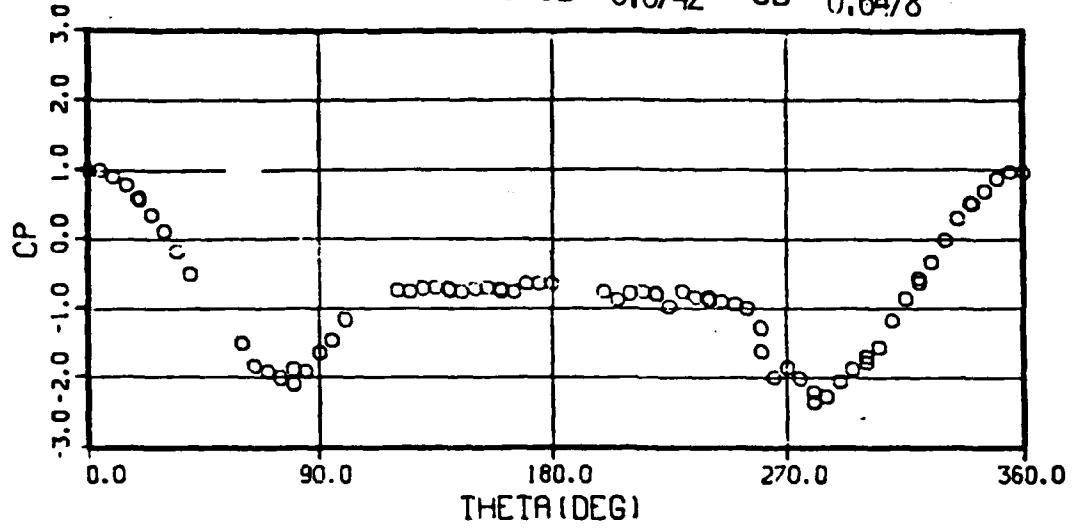
RUN 211 OIU- 21.0 +/- 20.96 RNDIU-1.445 +/- \*\*\*\*  
PIU- 6211. +/- 6210.60 VIU- 62.94 +/- 62.940  
MIU- .055 +/- .055 CL- -0.0689 CD- 0.6988



CP VALUES ALONG LONGITUDINAL RAYS AT  
POLAR ANGLE OF 40DEG-0 64DEG-+ 124DEG-X.  
THE 5 SETS OF POINTS AT EACH LOCATION  
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

CYLINDER + NO. 250 MESH SCREEN

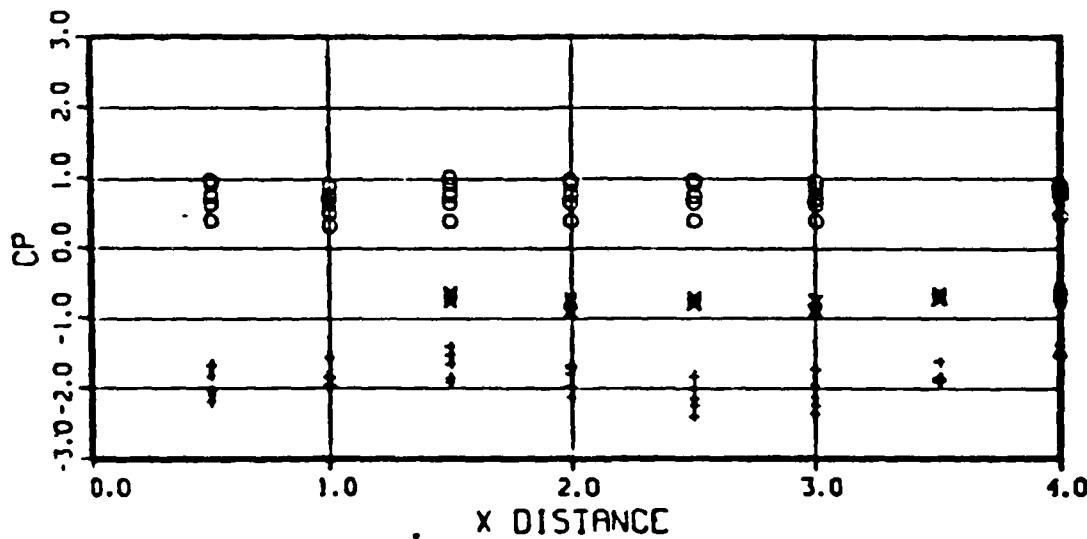
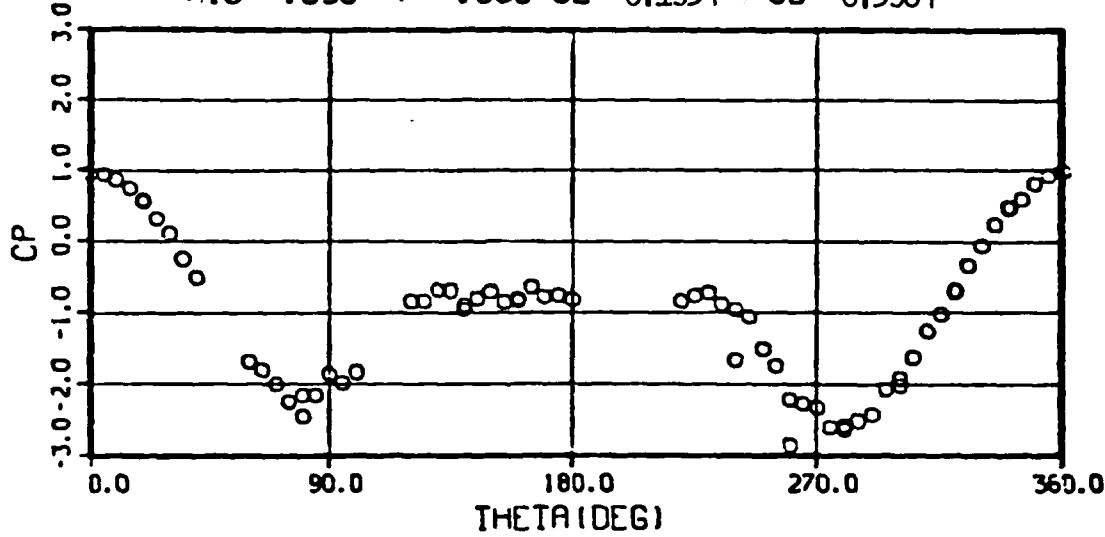
RUN 210 OIU- 11.5 +/- .06 RNDIU-1.194 +/- .003  
PIU- 7780, +/- 10.80 VIU- 51.96 +/- .128  
MIU- .046 +/- .000 CL- 0.0742 CD- 0.6478



LEGEND  
○ - 4 DEG  
△ - 24 DEG  
+ - 124 DEG

CYLINDER • NO. 250 MESH SCREEN

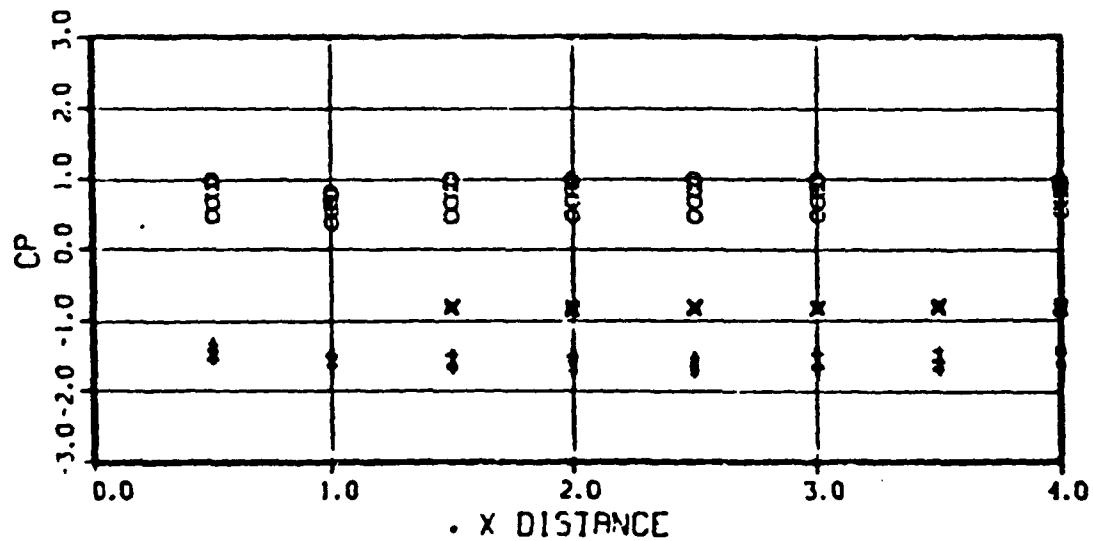
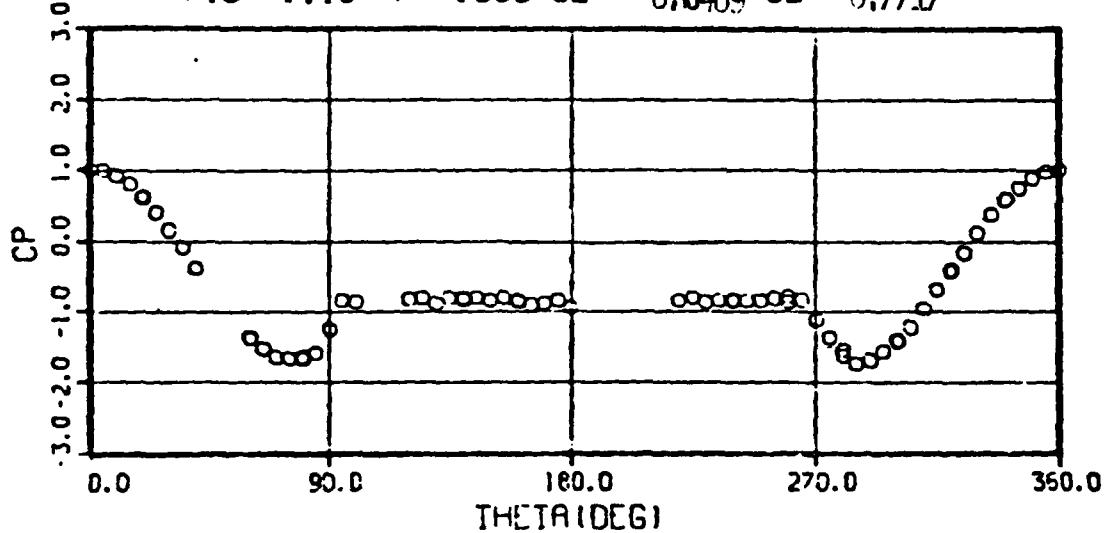
RUN 209 OIU- 7.2 +/- .00 RNDIU- .944 +/- .001  
 PIU- 7781. +/- 33.20 VIU- 41.24 +/- .054  
 MIU- .036 +/- .000 CL- 0.1934 CD- 0.5984



CP VALUES ALONG LONGITUDINAL RAYS AT  
 POLAR ANGLE OF 4DEG-0 64DEG-- 124DEG-X.  
 THE 5 SETS OF POINTS AT EACH LOCATION  
 CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

CYLINDER + NO. 250 MESH SCREEN

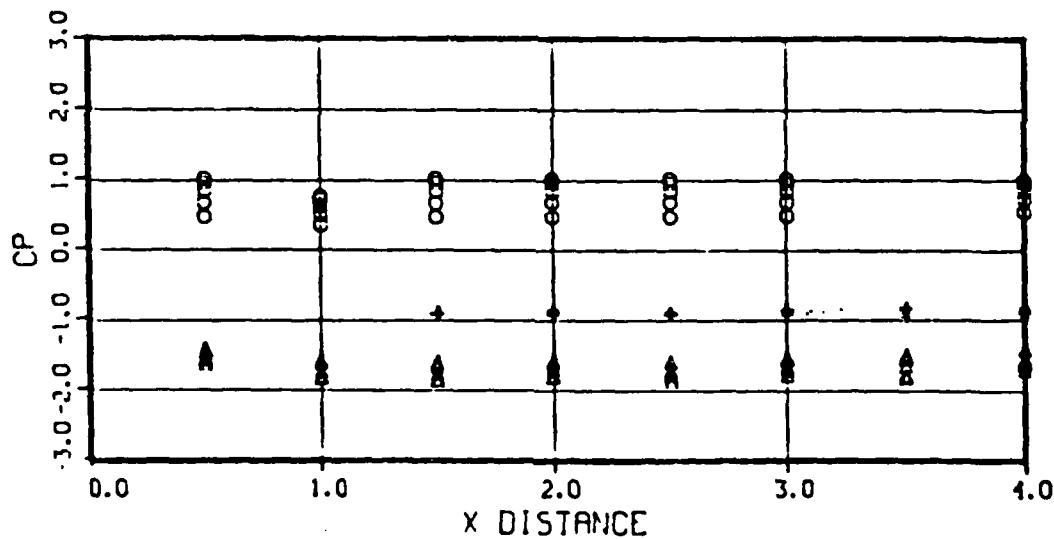
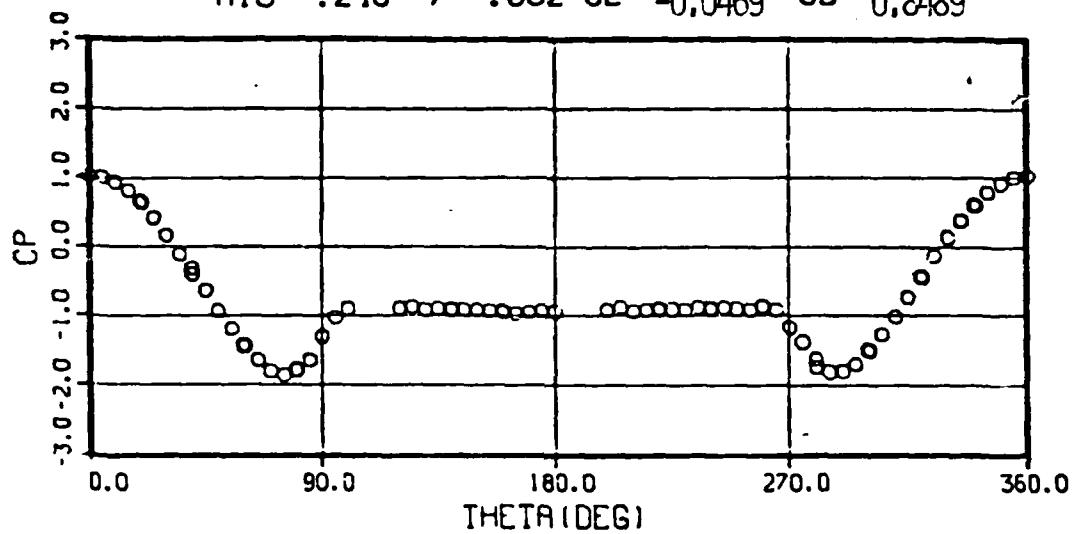
RUN 208 OIU- 68.3 +/- .48 RNDIU-2.887 +/- .007  
 PIU- 7682. +/- 25.40 VIU-127.98 +/- .332  
 MIU- .113 +/- .000 CL- -0.0469 CO- 0.7717



CP VALUES ALONG LONGITUDINAL RAYS AT  
 POLAR ANGLE OF 4DEG-0 64DEG-+ 124DEG-X.  
 THE 5 SETS OF POINTS AT EACH LOCATION  
 CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

CYLINDER • NO. 250 MESH SCREEN

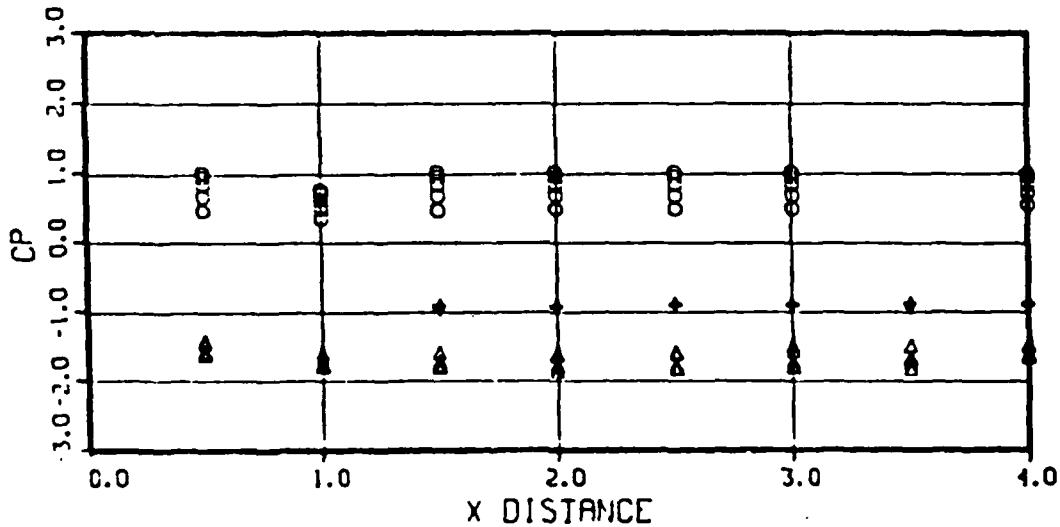
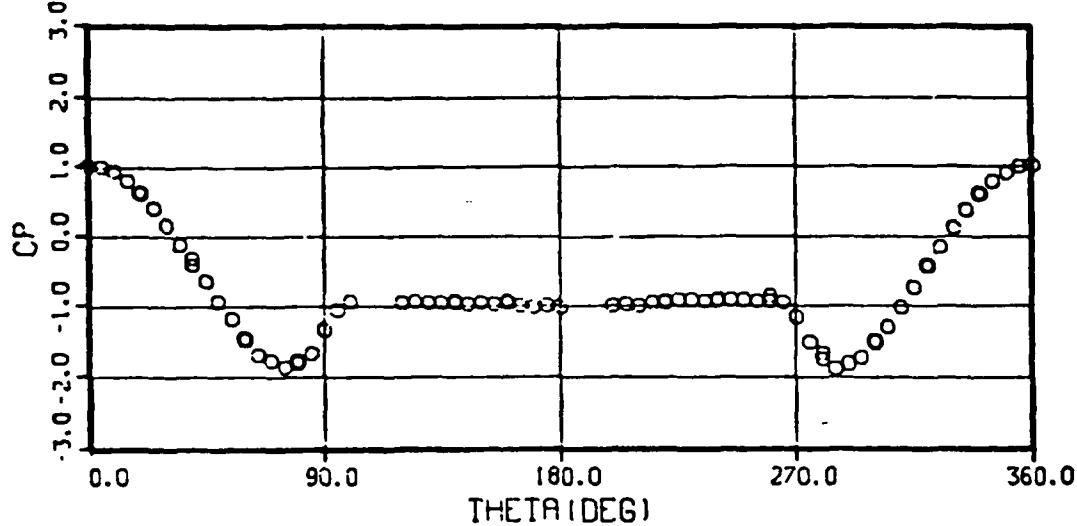
RUN 206 D1U-387.9 +/- 4.98 RND1U-7.009 +/- .046  
PIU- 9014. +/- 7.00 VIU-288.41 +/- 1.848  
MIU- .248 +/- .002 CL- -0.0469 CD- 0.8489



CP VALUES ALONG LONGITUDINAL RAYS AT  
POLAR ANGLE OF 4DEG-0 64DEG-- 124DEG-X.  
THE 5 SETS OF POINTS AT EACH LOCATION  
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

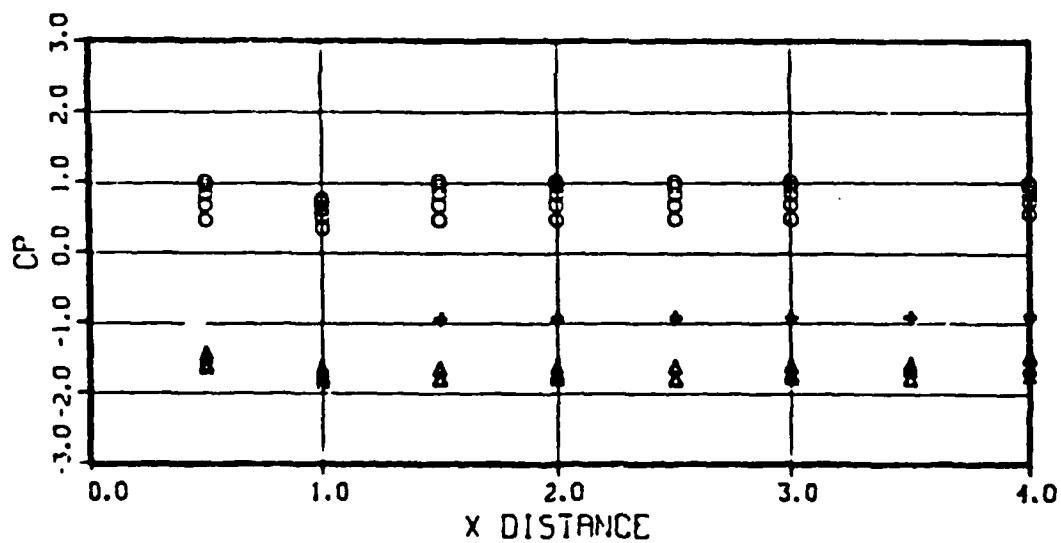
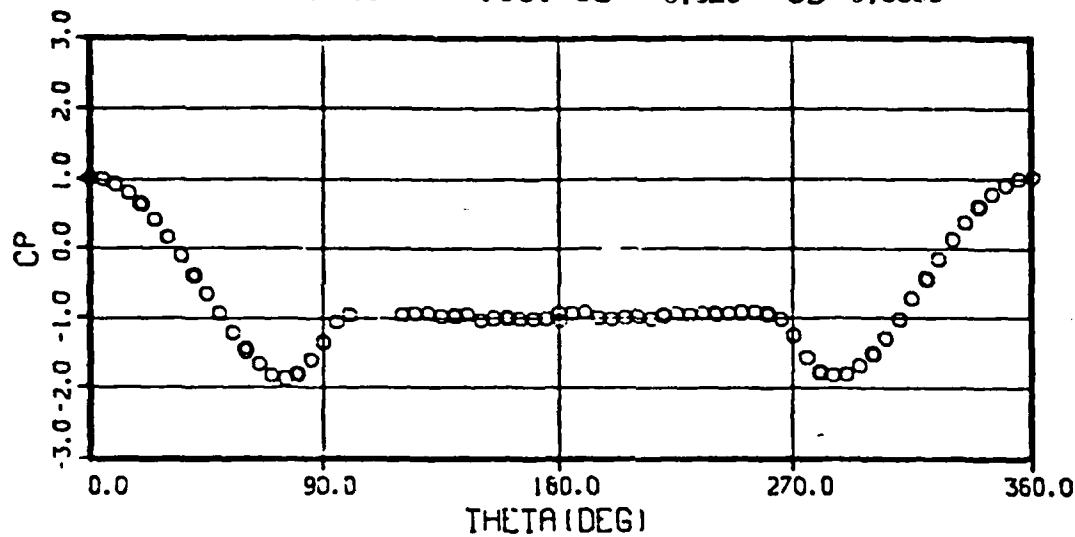
CYLINDER • NO. 250 MESH SCREEN

RUN 205 OIU-340.9 +/- 2.84 RNDIU-6.192 +/- .028  
PIU- 7882. +/- 6.60 VIU-288.26 +/- 1.118  
MIU- .249 +/- .001 CL- -0.03 CD- 0.8918



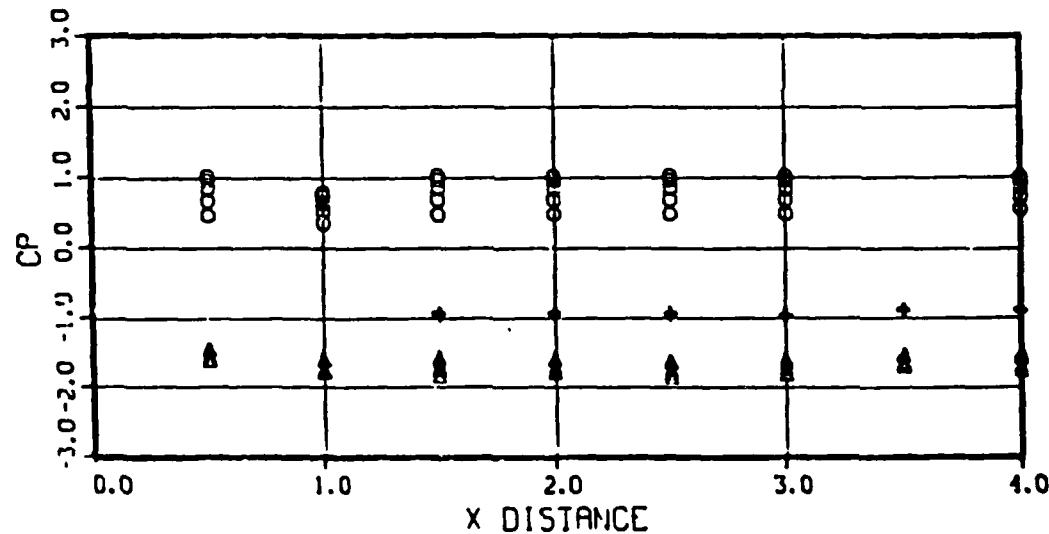
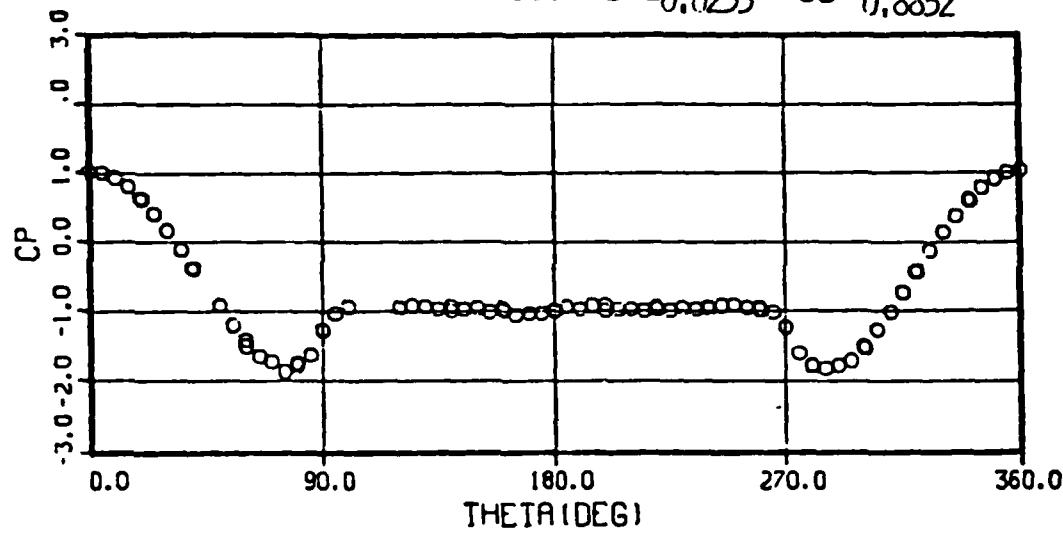
CP VALUES ALONG LONGITUDINAL RAYS AT  
POLAR ANGLE OF 4DEG-0 64DEG-+ 124DEG-X.  
THE 5 SETS OF POINTS AT EACH LOCATION  
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

CYLINDER • NO. 250 MESH SCREEN  
 RUN 204 OIU-279.5 +/- .56 RNDIU-5.143 +/- .006  
 PIU- 6506. +/- 6.20 VIU-286.20 +/- .334  
 MIU- .248 +/- .001 CL- -0.026 CD- 0.8898



CP VALUES ALONG LONGITUDINAL RAYS AT  
 POLAR ANGLE OF 4DEG-0 64DEG-+ 124DEG-X.  
 THE 5 SETS OF POINTS AT EACH LOCATION  
 CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

CYLINDER + NO. 250 MESH SCREEN  
 RUN 203 QIU-221.3 +/- 1.42 RNDIU-4.109 +/- .012  
 PIU- 5138. +/- 11.20 VIU-285.47 +/- .892  
 MIU- .248 +/- .001 CL- -0.0235 CD- 0.8852



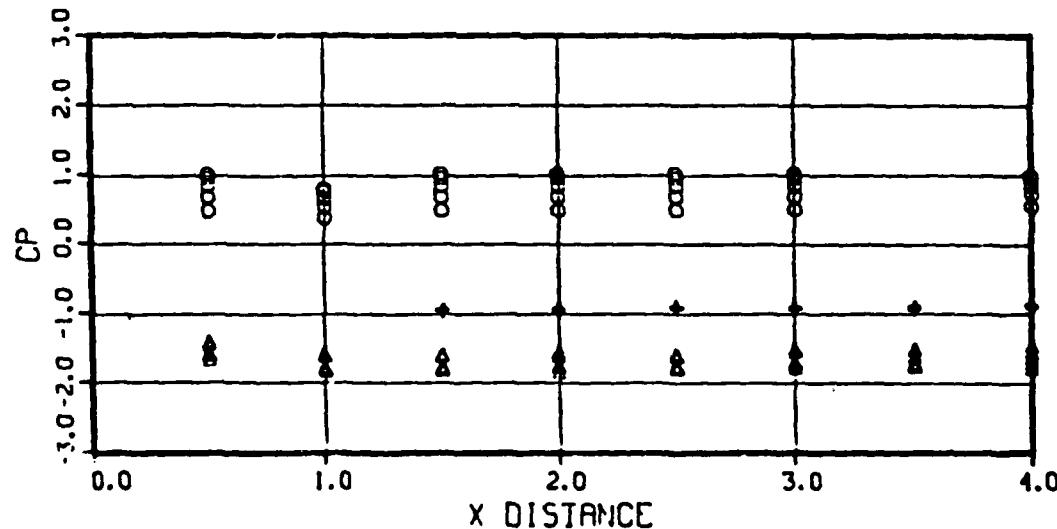
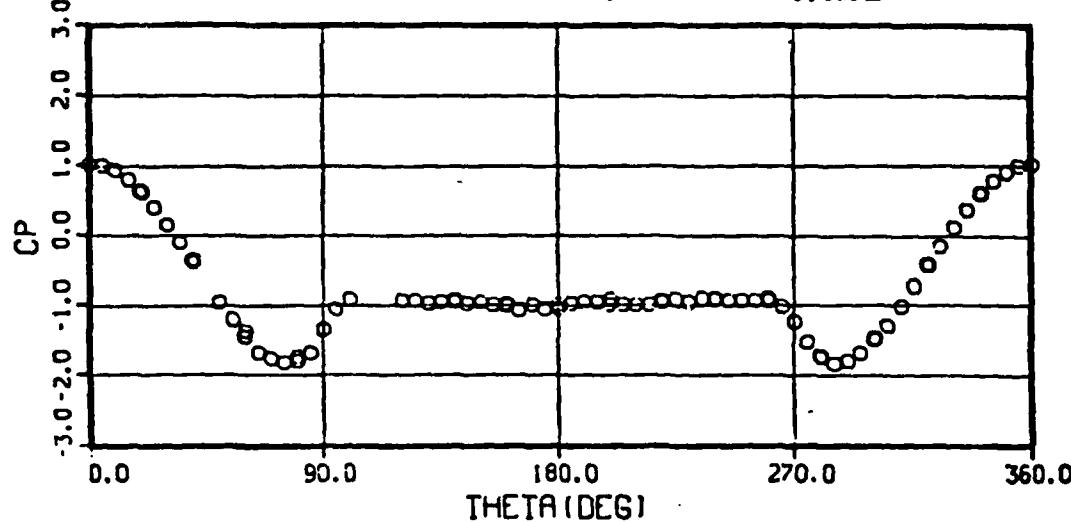
CP VALUES ALONG LONGITUDINAL RAYS AT  
 POLAR ANGLE OF 40DEG-0 64DEG-- 124DEG-X.  
 THE 5 SETS OF POINTS AT EACH LOCATION  
 CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

CYLINDER • NO. 250 MESH SCREEN

RUN 202 OIU-165.9 +/- 1.14 RNDIU-3.109 +/- .012

PIU- 3851. +/- 1.20 VIU-284.33 +/- .954

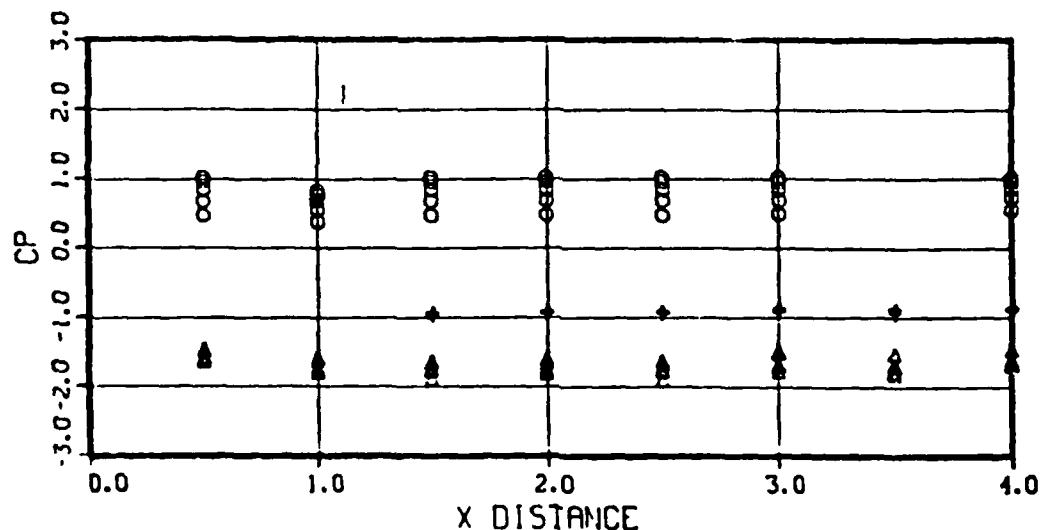
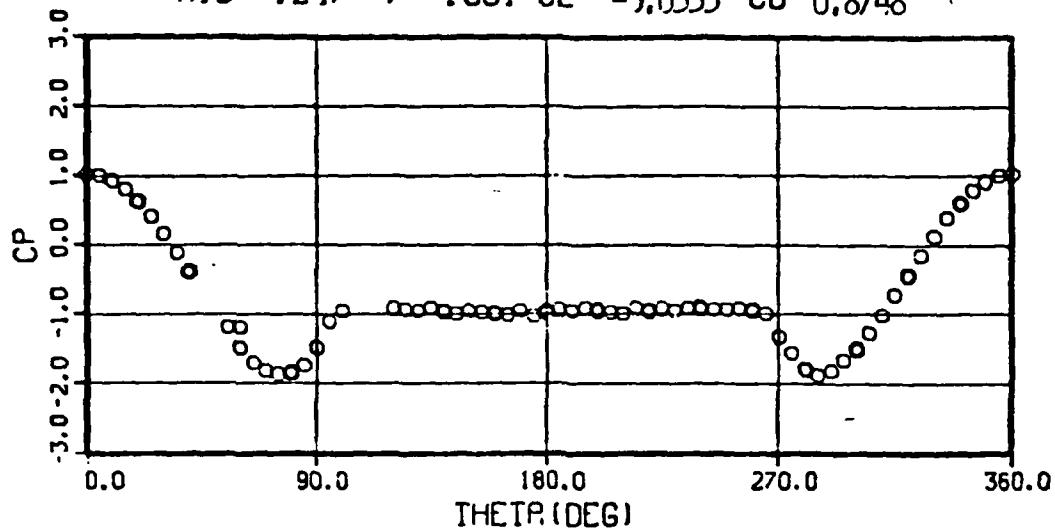
MIU- .248 +/- .001 CL- -0.0419. CD- 0.8952



CP VALUES ALONG LONGITUDINAL RAYS AT  
POLAR ANGLE OF 4DEG-0 64DEG-- 124DEG-X.  
THE 5 SETS OF POINTS AT EACH LOCATION  
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

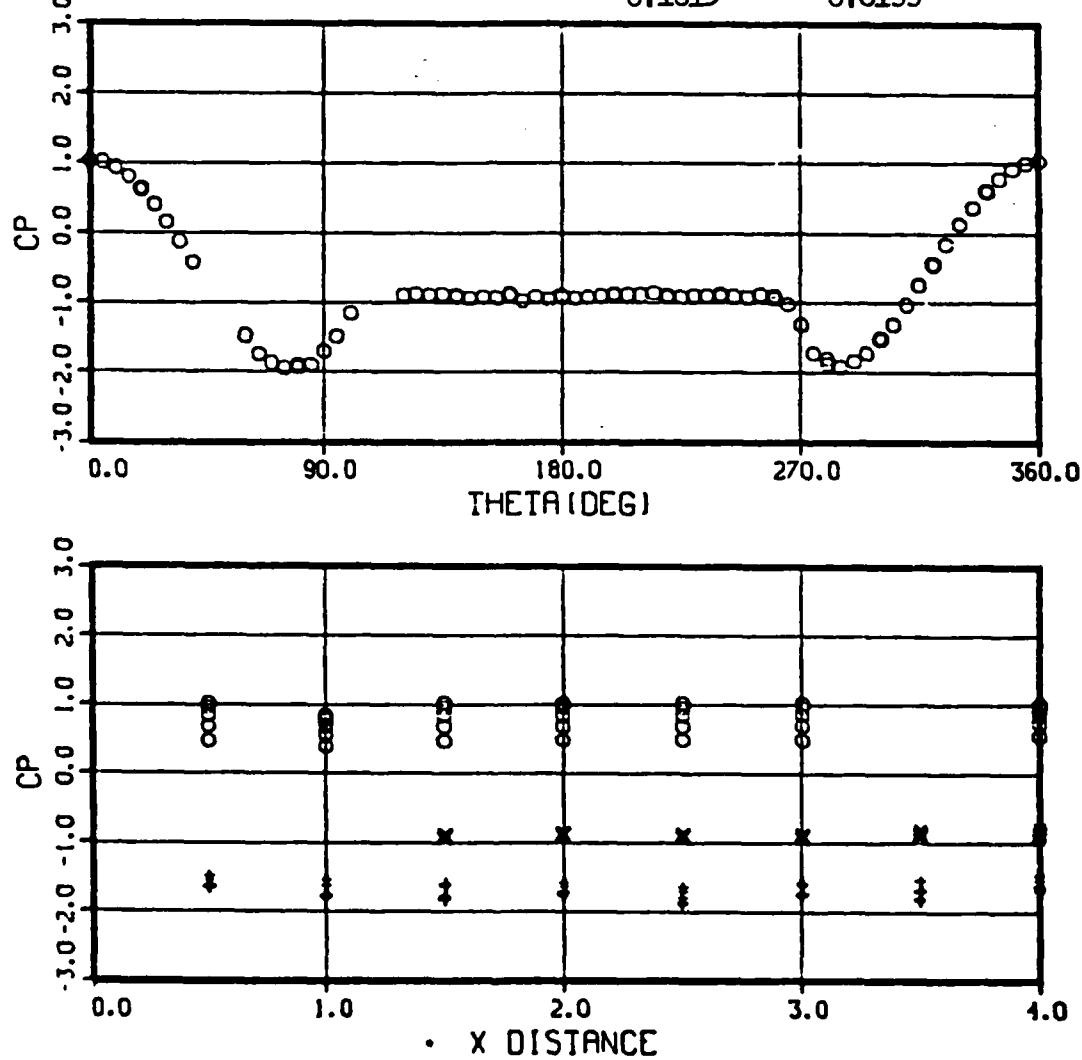
CYLINDER • NO. 250 MESH SCREEN

RUN 201 OIU-136.4 +/- .68 RNDIU-2.571 +/- .006  
PIU- 3198. +/- 2.00 VIU-282.90 +/- .768  
MIU- .247 +/- .001 CL- -0.0553 CD- 0.8748



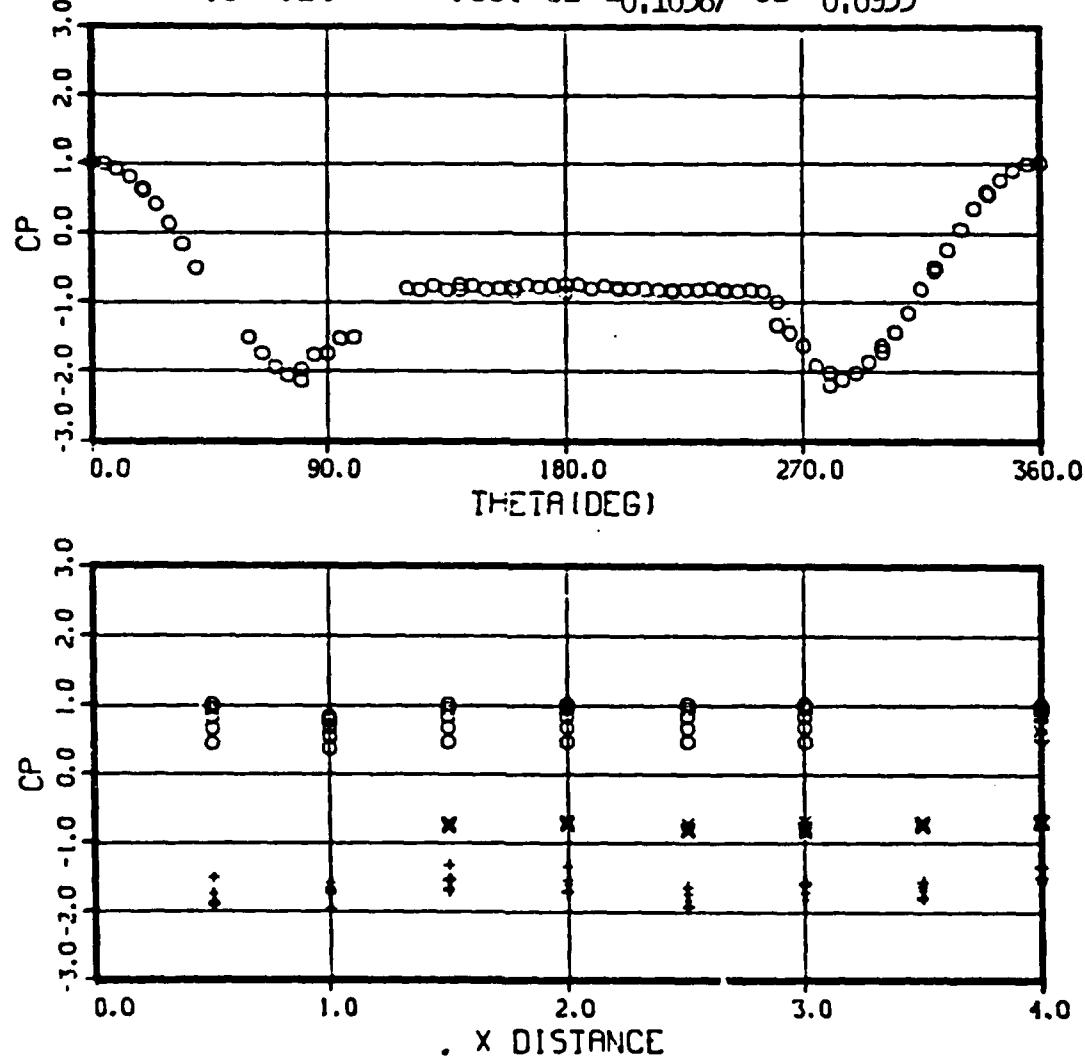
CP VALUES ALONG LONGITUDINAL RAYS AT  
POLAR ANGLE OF 40DEG-0 64DEG-+ 124DEG-X.  
THE 5 SETS OF POINTS AT EACH LOCATION  
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

CYLINDER + NO. 250 MESH SCREEN  
 RUN 200 O1U-108.9 +/- .50 RND1U-2.076 +/- .006  
 PIU- 2563. +/- 6.80 VIU-281.32 +/- .485  
 MIU- .246 +/- .001 CL- -0.1013 CD- 0.8199



CP VALUES ALONG LONGITUDINAL RAYS AT  
 POLAR ANGLE OF 4DEG-0 64DEG-+ 124DEG-X.  
 THE 5 SETS OF POINTS AT EACH LOCATION  
 CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

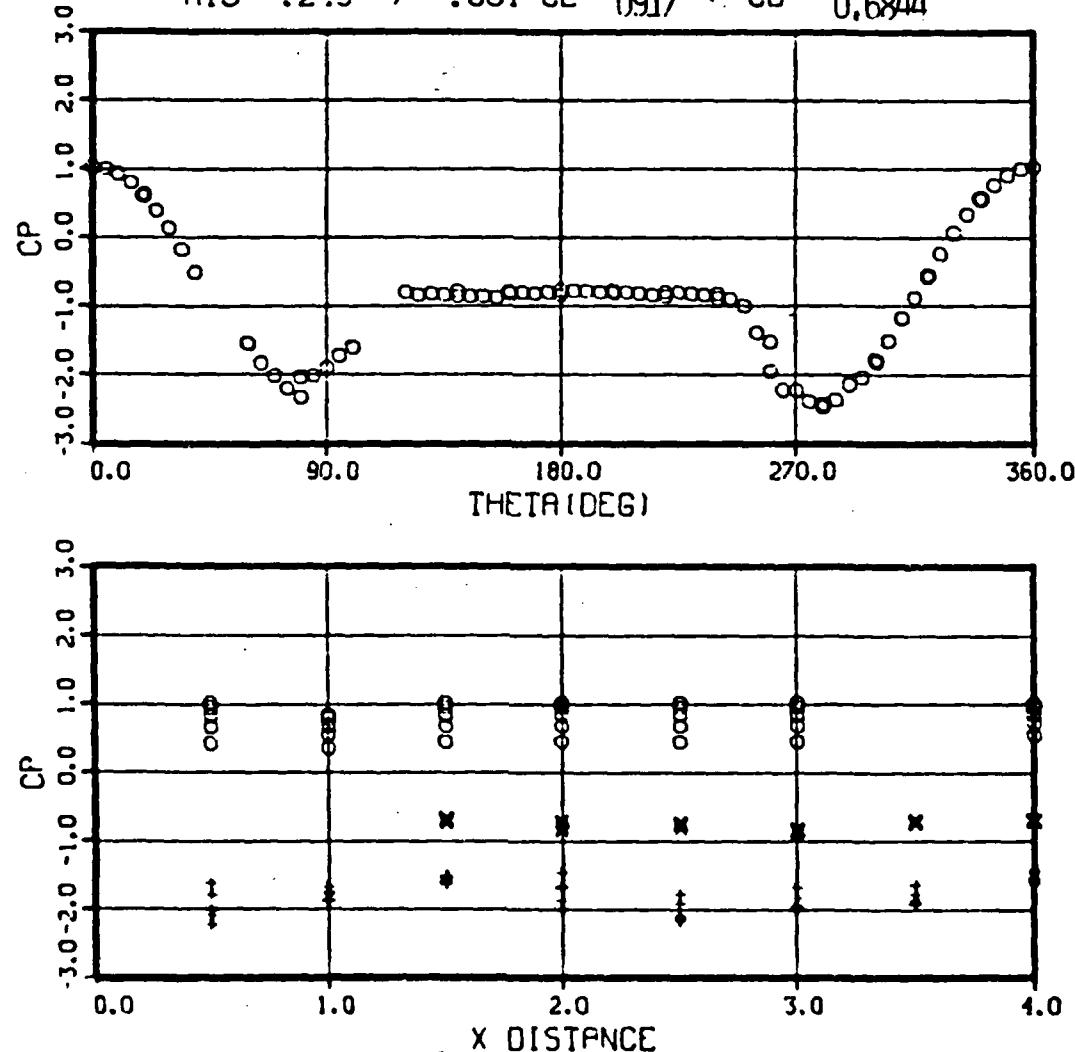
CYLINDER • NO. 250 MESH SCREEN  
 RUN 199 O1U- 77.7 +/- .36 RNDIU-1.532 +/- .003  
 PIU- 1822. +/- 2.60 VIU-277.92 +/- .558  
 MIU- .247 +/- .001 CL- -0.10587 CD- 0.6933



CP VALUES ALONG LONGITUDINAL RAYS AT  
 POLAR ANGLE OF 4DEG-0 64DEG-+ 124DEG-X.  
 THE 5 SETS OF POINTS AT EACH LOCATION  
 CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

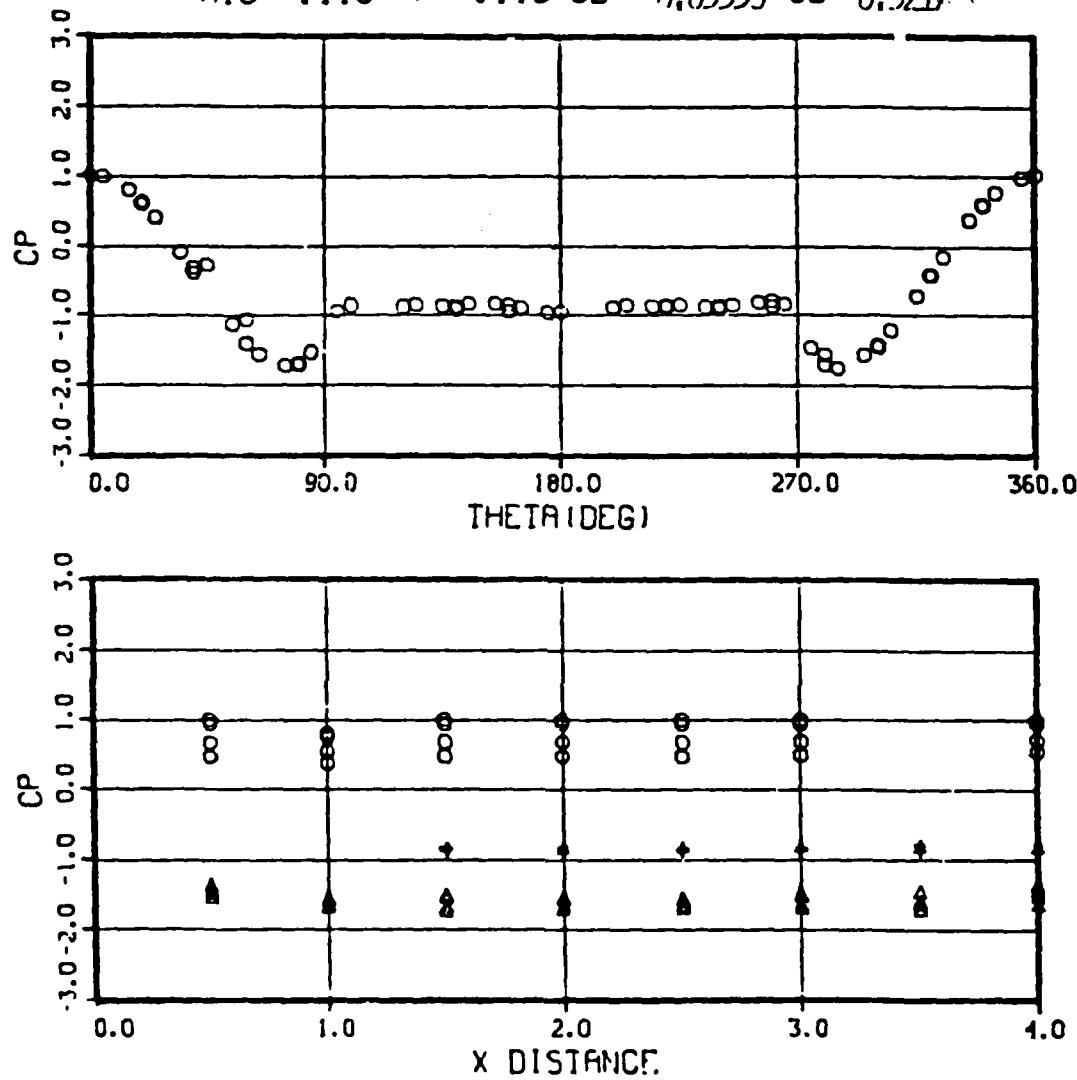
CYLINDER • NO. 250 MESH SCREEN

RUN 198 O1U- 62.9 +/- .00 RNDIU-1.267 +/- .001  
 PIU- 1492. +/- 2.60 VIU-274.69 +/- .098  
 MIU- .245 +/- .001 CL- 0917 CD- 0.6844



CP VALUES ALONG LONGITUDINAL RAYS AT  
 POLAR ANGLE OF 4DEG-O 64DEG-+ 124DEG-X.  
 THE 5 SETS OF POINTS AT EACH LOCATION  
 CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

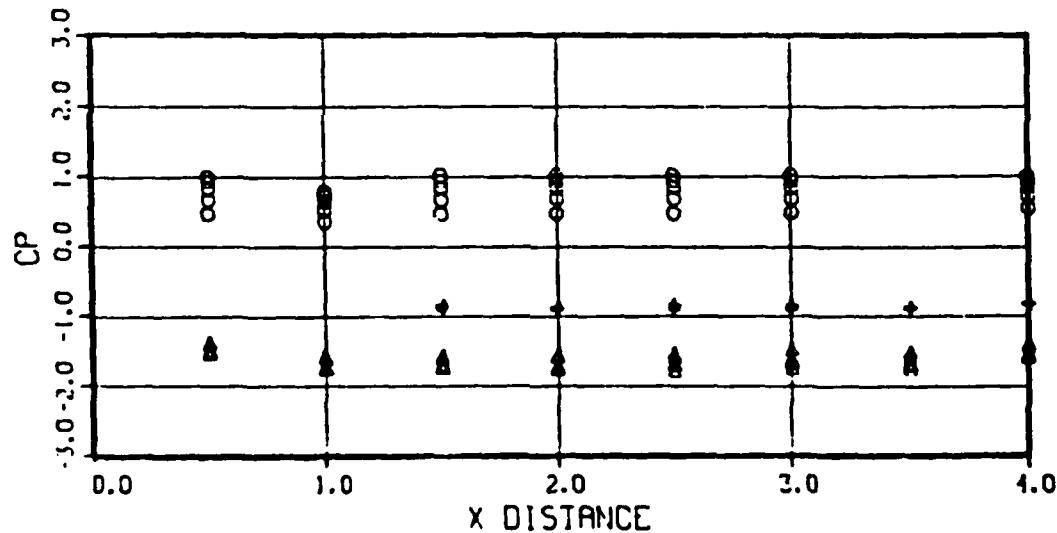
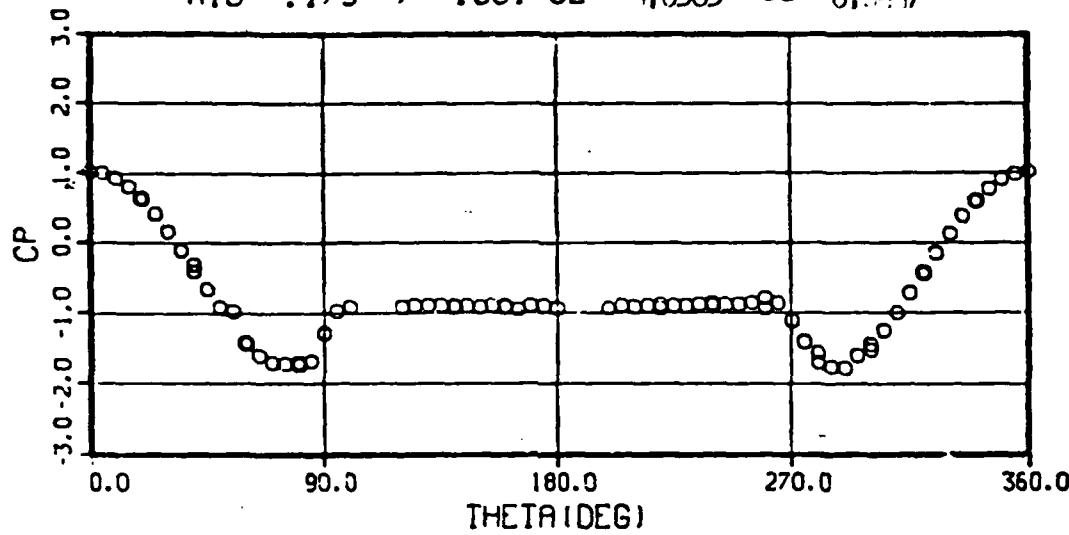
CYLINDER • NO. 250 MESH SCREEN  
 RUN 213 O1U- 82.5 +/- 82.50 RNDIU-2.845 +/-  
 PIU- 6167. +/- 6156.60 VIU-125.54 +/-  
 MIU- .110 +/- .110 CL- -.05539 CD- 0.5217



CP VALUES ALONG LONGITUDINAL RAYS AT  
 POLAR ANGLE OF 4DEG-0 64DEG-+ 124DEG-X.  
 THE 5 SETS OF POINTS AT EACH LOCATION  
 CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

CYLINDER + NO. 250 MESH SCREEN

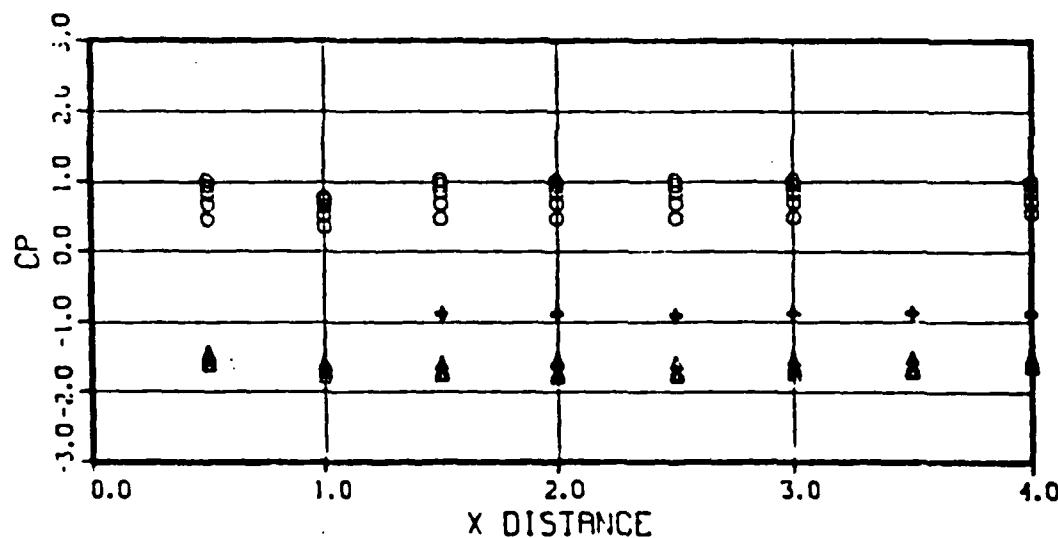
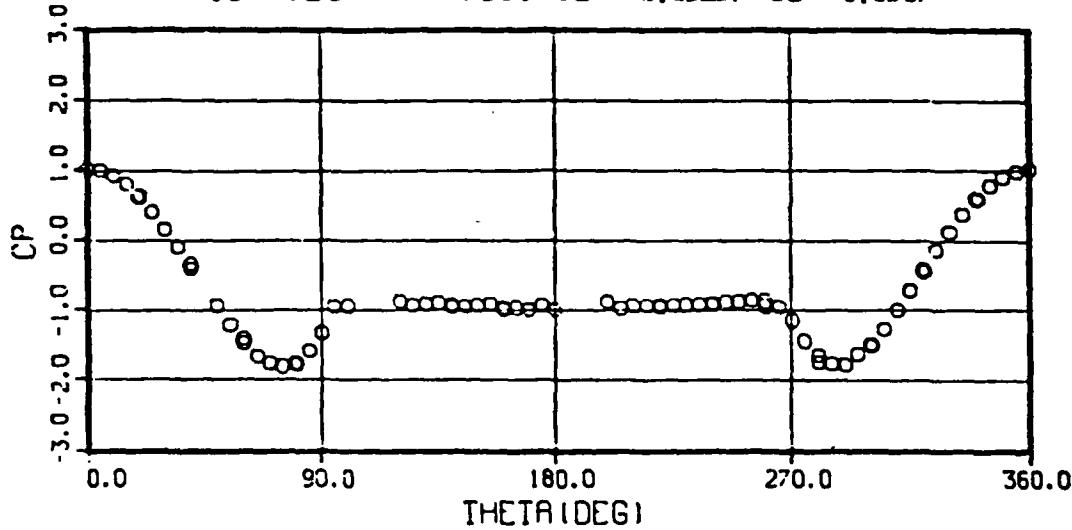
RUN 214 OIU-160.4 +/- .92 RNDIU-4.405 +/- .011  
 PIU- 7656. +/- 4.00 VIU-196.65 +/- .648  
 MIU- .173 +/- .001 CL- -0.0583 CD- 0.9447



CP VALUES ALONG LONGITUDINAL RAYS AT  
 POLAR ANGLE OF 4DEG-0 64DEG-+ 124DEG-X.  
 THE 5 SETS OF POINTS AT EACH LOCATION  
 CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

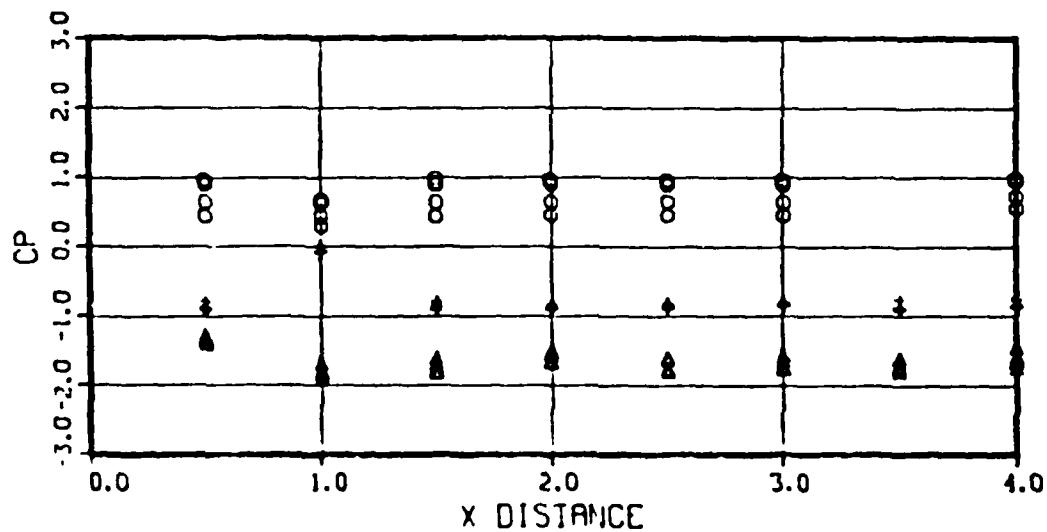
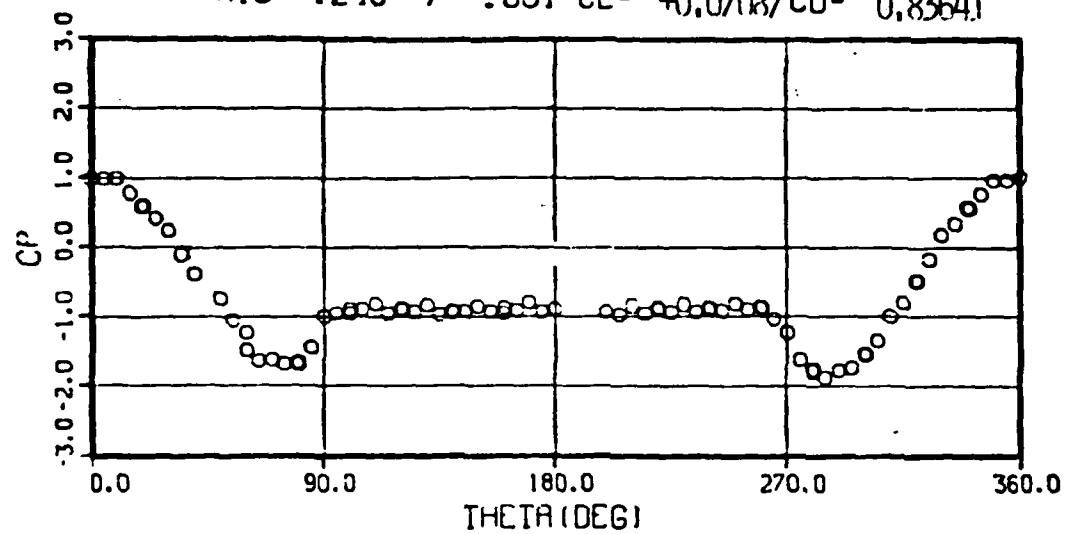
CYLINDER • NO. 250 MESH SCREEN

RUN 215 O1U-227.8 +/- .76 RND1U-5.208 +/- .016  
 P1U- 7608. +/- 1.60 V1U-235.51 +/- .310  
 MIU- .207 +/- .001 CL- -0.05237 CD- 0.8597



CP VALUES ALONG LONGITUDINAL RAYS AT  
 POLAR ANGLE OF 4DEG-0 64DEG-+ 121DEG-X.  
 THE 5 SETS OF POINTS AT EACH LOCATION  
 CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

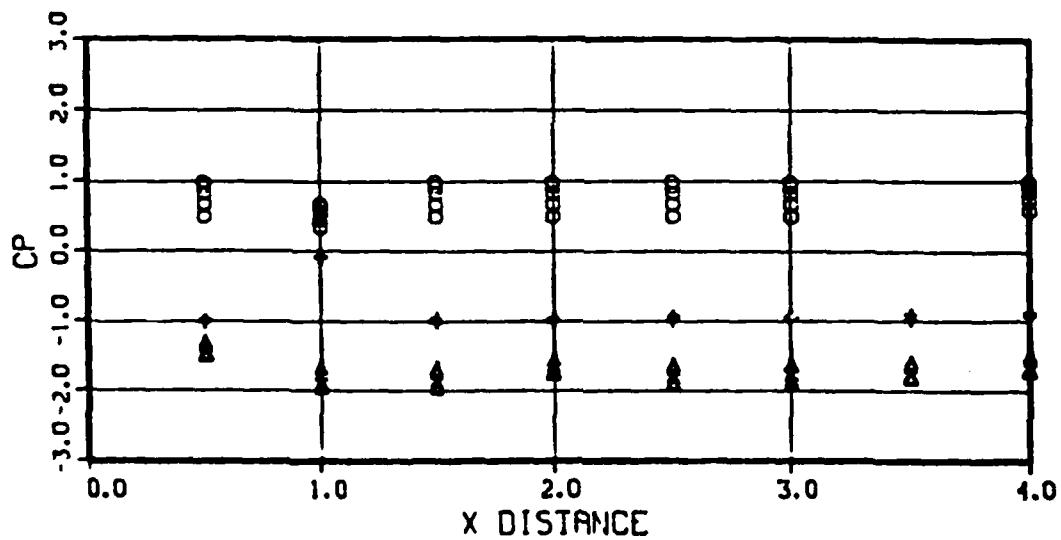
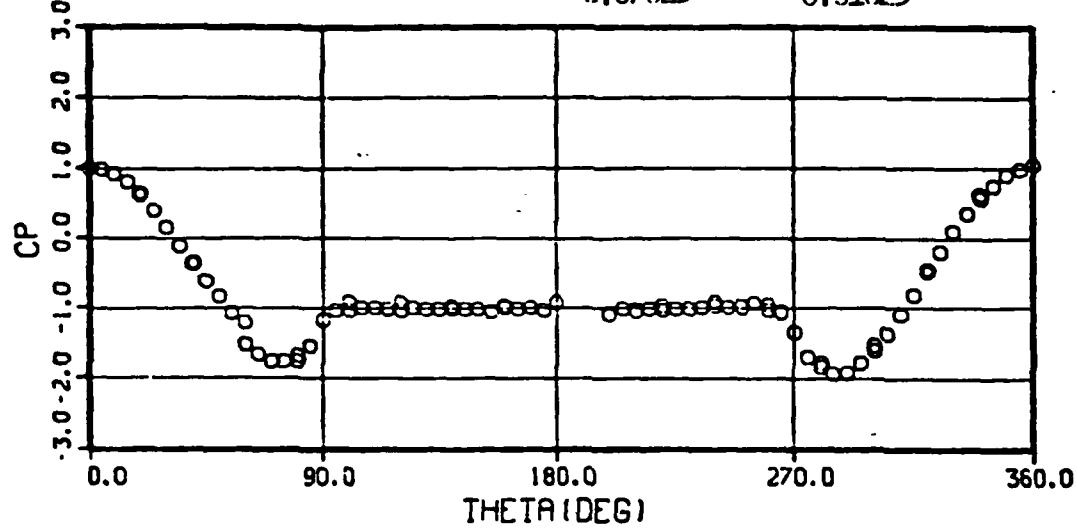
CYLINDER - NO. 60 MESH SCREEN  
 RUN 226 CIU- 21.8 +/- .62 RNDIU- .435 +/- .010  
 PIU- 515. +/- 19.00 VIU-276.14 +/- .352  
 MIU- .246 +/- .001 CL- +0.07087 CD- 0.83641



CP VALUES ALONG LONGITUDINAL RAYS AT  
 POLAR ANGLE OF 4DEG-0 64DEG-+ 121DEG-X.  
 THE 5 SETS OF POINTS AT EACH LOCATION  
 CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

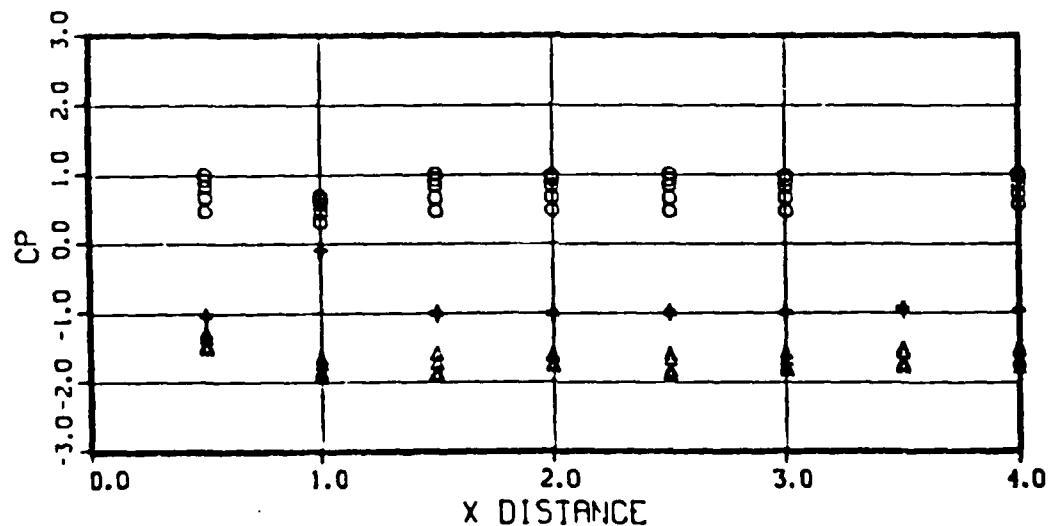
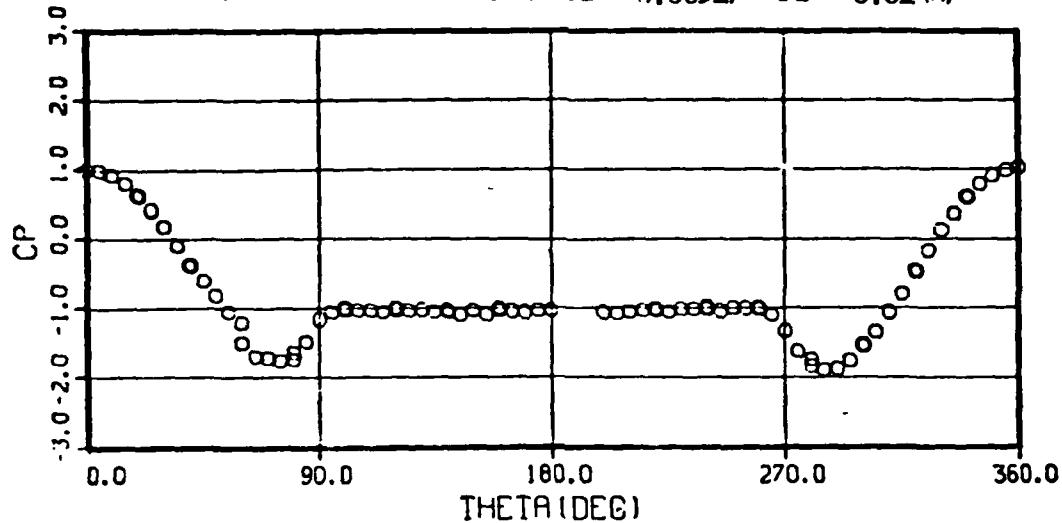
CYLINDER • NO. 60 MESH SCREEN

RUN 227 O1U- 25.9 +/- .14 RND1U- .506 +/- .003  
PIU- 603. +/- 4.20 VIU-279.26 +/- .536  
MIU- .248 +/- .001 CL- 0.07025 CD- 0.91023



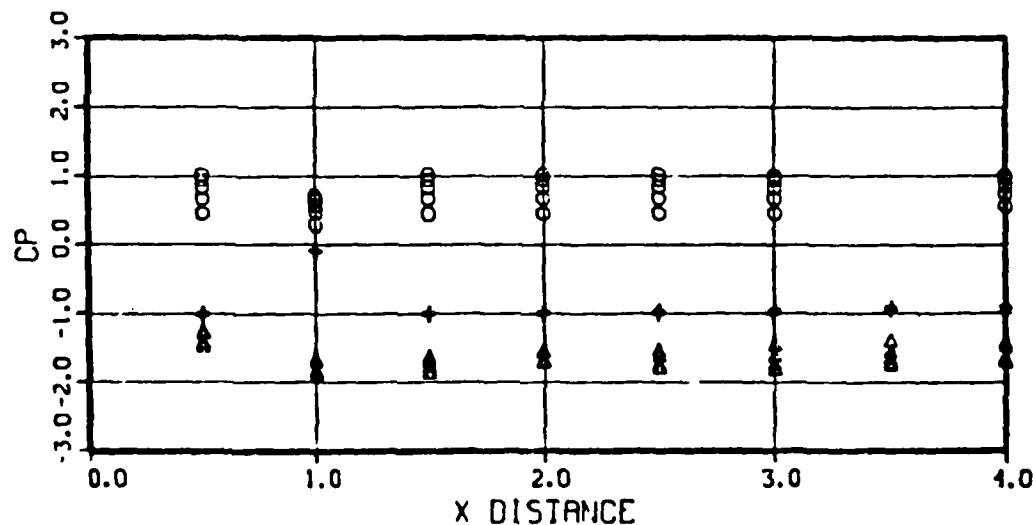
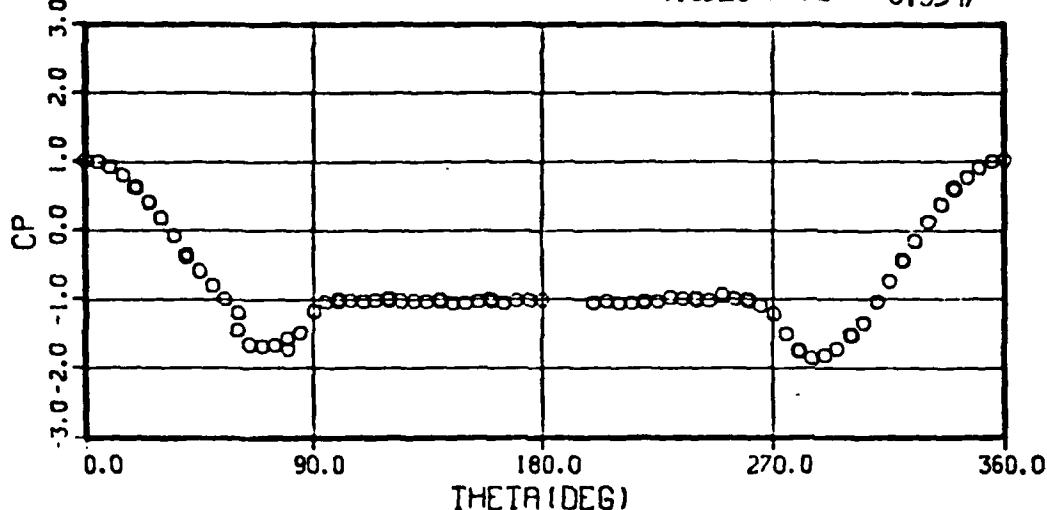
CP VALUES ALONG LONGITUDINAL RAYS AT  
POLAR ANGLE OF 40DEG-0 64DEG-+ 124DEG-X.  
THE 5 SETS OF POINTS AT EACH LOCATION  
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

CYLINDER • NO. 60 MESH SCREEN  
RUN 228 OIU- 32.0 +/- .22 RNDIU- .617 +/- .003  
PIU- 736. +/- 3.80 VIU-282.04 +/- .848  
MIU- .249 +/- .001 CL- 0.06327 CD- 0.81407



CP VALUES ALONG LONGITUDINAL RAYS AT  
POLAR ANGLE OF 40DEG-0 64DEG-+ 124DEG-X.  
THE 5 SETS OF POINTS AT EACH LOCATION  
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

CYLINDER + NO. 60 MESH SCREEN  
 RUN 229 OIU- 37.8 +/- .24 RNDIU- .722 +/- .003  
 PIU- 860. +/- 3.20 VIU-284.15 +/- .660  
 MIU- .251 +/- .001 CL- 0.0528 CD- 0.9547



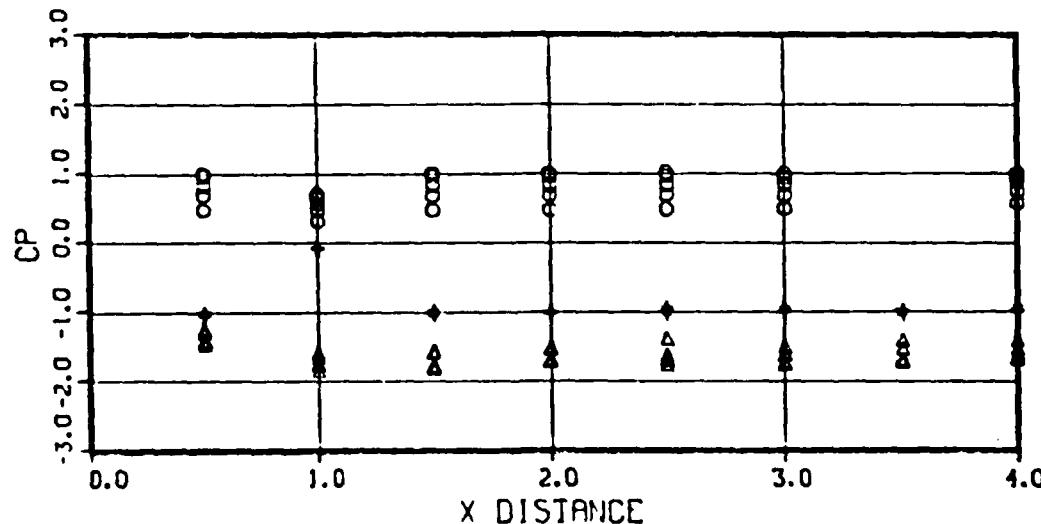
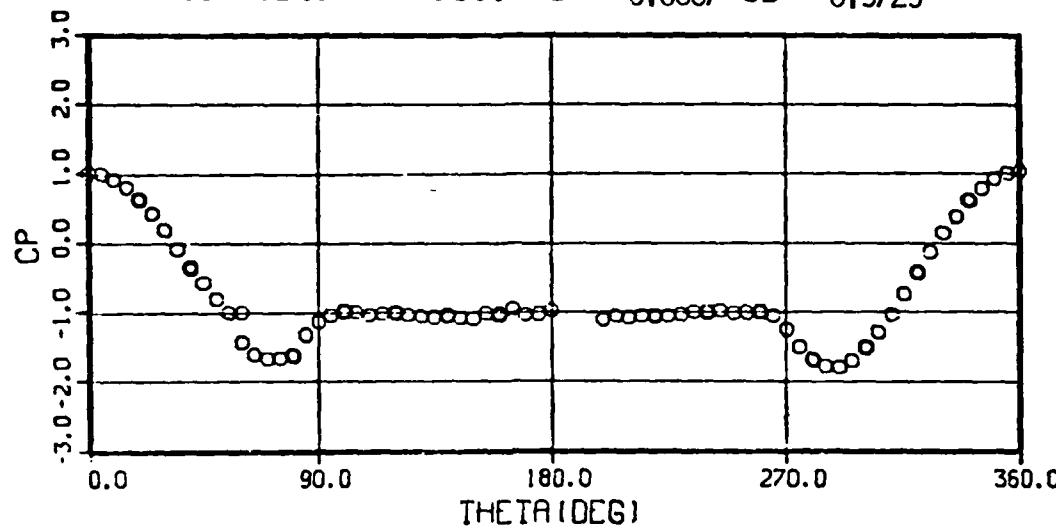
CP VALUES ALONG LONGITUDINAL RAYS AT  
 POLAR ANGLE OF 4DEG-0 64DEG-- 124DEG-X.  
 THE 5 SETS OF POINTS AT EACH LOCATION  
 CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

CYLINDER + NO. 60 MESH SCREEN

RUN 230 OIU- 43.3 +/- .34 RNDIU- .829 +/- .007

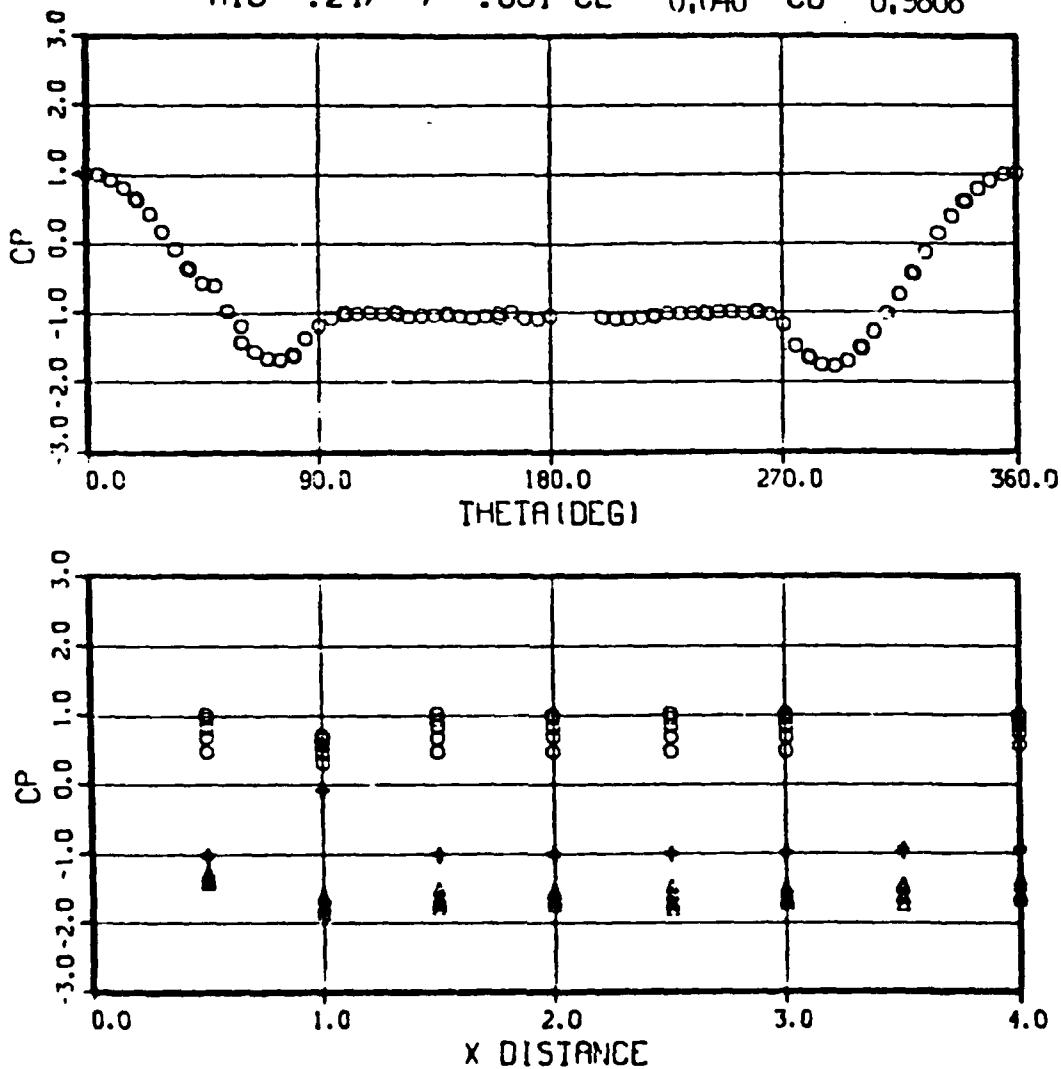
PIU- 997. +/- 9.40 VIU-282.59 +/- .808

MIU- .249 +/- .001 CL- 0.0607 CD- 0.9729



CP VALUES ALONG LONGITUDINAL RAYS AT  
POLAR ANGLE OF 40DEG-0 64DEG-+ 124DEG-X.  
THE 5 SETS OF POINTS AT EACH LOCATION  
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

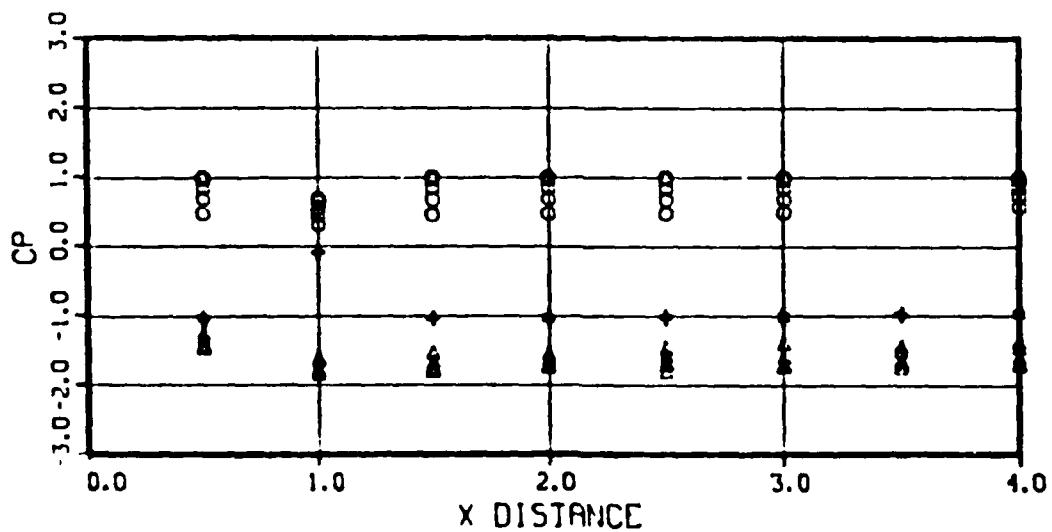
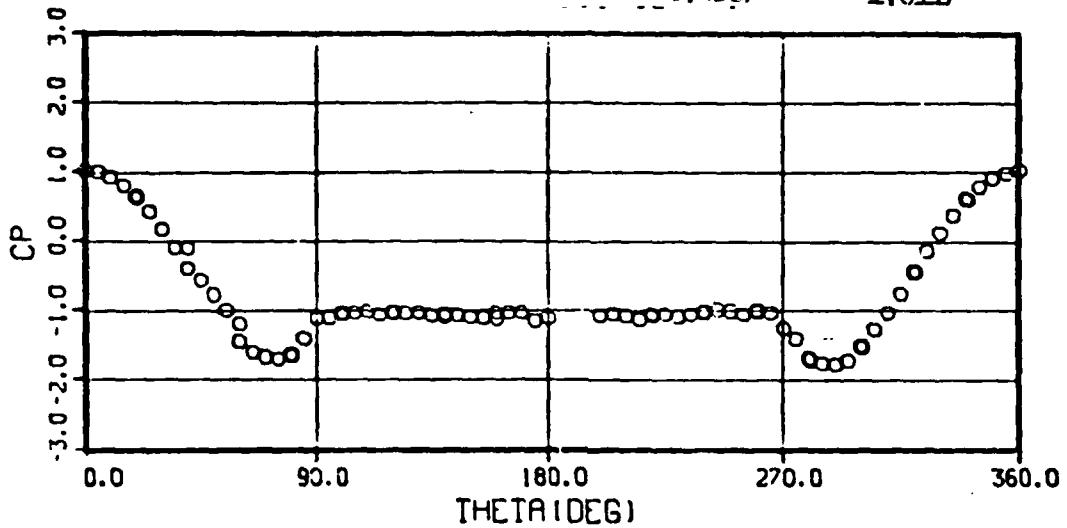
CYLINDER • NO. 60 MESH SCREEN  
 RUN 231 DIU- 48.0 +/- .10 RNDIU- .925 +/- .003  
 PIU- 1118. +/- 3.20 VIU-281.04 +/- .512  
 MIU- .247 +/- .001 CL- 0.046 CD- 0.9868



CP VALUES ALONG LONGITUDINAL RAYS AT  
 POLAR ANGLE OF 4DEG-0 64DEG-+ 124DEG-X.  
 THE 5 SETS OF POINTS AT EACH LOCATION  
 CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

CYLINDER + NO. 60 MESH SCREEN

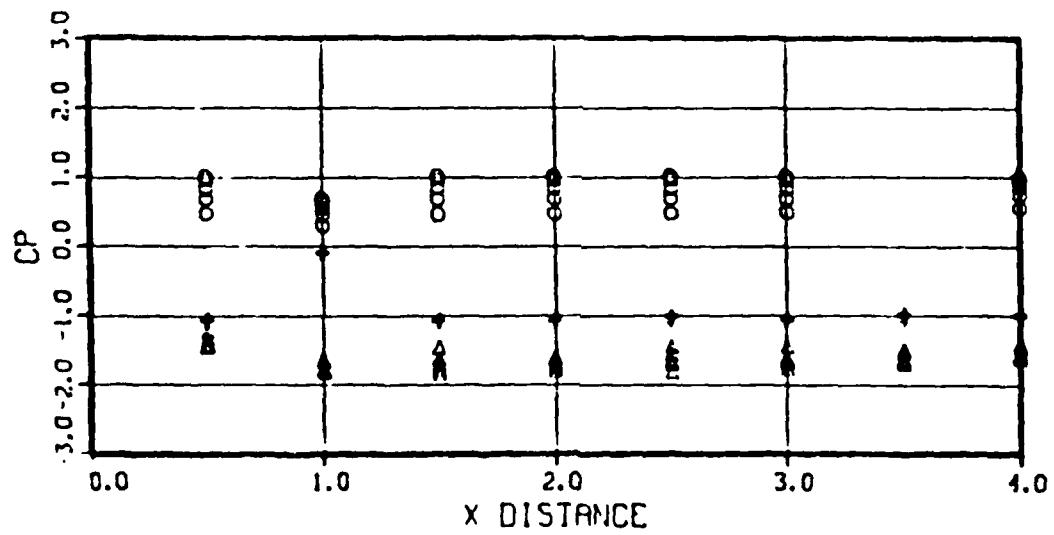
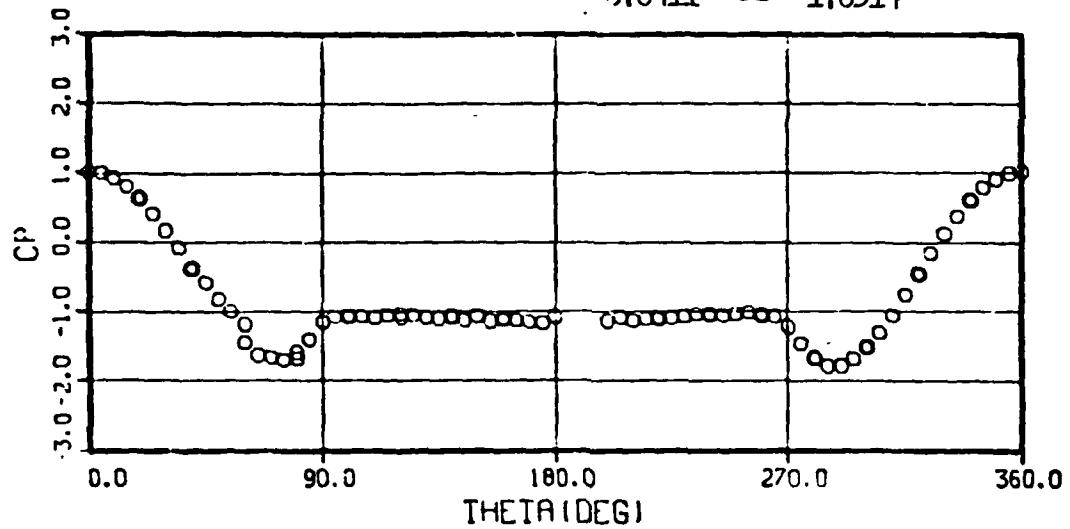
RUN 232 OIU- 53.5 +/- .16 RNDIU-1.027 +/- .003  
PIU- 1241. +/- 3.40 VIU-281.62 +/- .712  
MIU- .248 +/- .001 CL- 0.0597 CD- 1.0117



CP VALUES ALONG LONGITUDINAL RAYS AT  
POLAR ANGLE OF 40DEG-0 64DEG-+ 124DEG-X.  
THE 5 SETS OF POINTS AT EACH LOCATION  
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

CYLINDER • NO. 60 MESH SCREEN

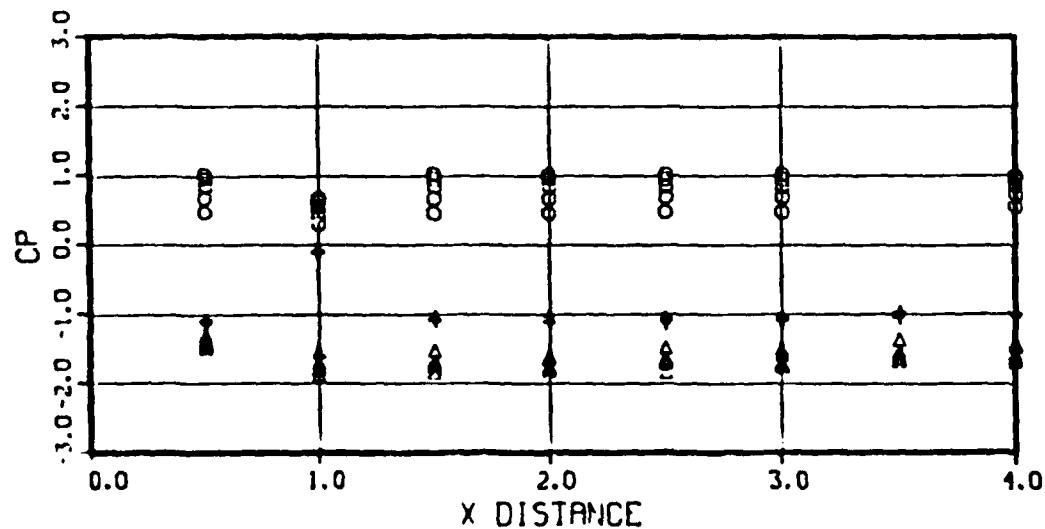
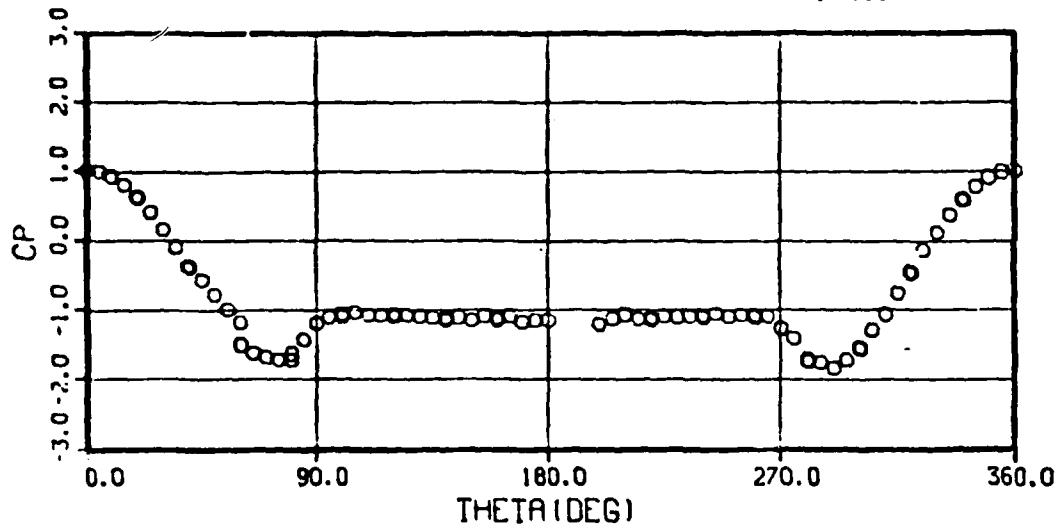
RUN 233 OIU- 66.5 +/- .26 RNDIU-1.277 +/- .002  
 PIU- 1553. +/- 2.60 VIU-281.32 +/- .748  
 MIU- .247 +/- .001 CL- 0.0411 CD- 1.0314



CP VALUES ALONG LONGITUDINAL RAYS AT  
 POLAR ANGLE OF 40DEG-0 64DEG-+ 124DEG-X.  
 THE 5 SETS OF POINTS AT EACH LOCATION  
 CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

CYLINDER + NO. 60 MESH SCREEN

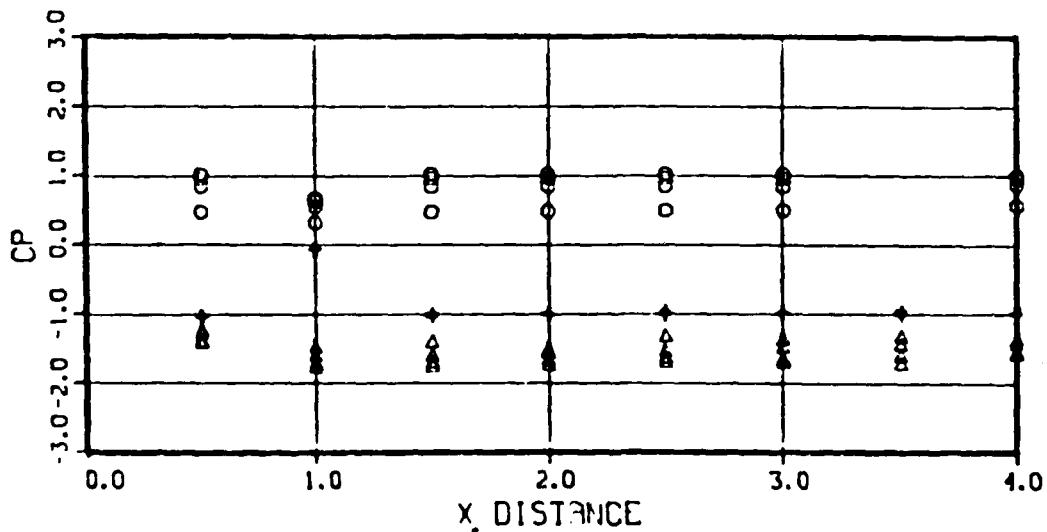
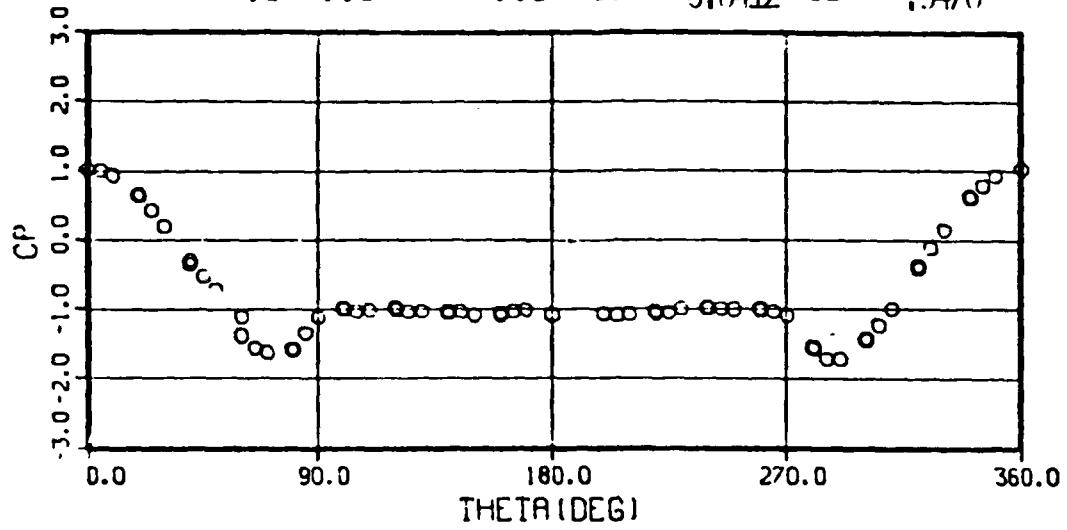
RUN 234 O1U- 79.7 +/- .60 RNDIU-1.530 +/- .009  
PIU- 1869. +/- 5.40 VIU-280.82 +/- .958  
MIL- .247 +/- .001 CL- 0.047 CD- 1.0468



CP VALUES ALONG LONGITUDINAL RAYS AT  
POLAR ANGLE OF 40DEG-0 64DEG-+ 124DEG-X.  
THE 5 SETS OF POINTS AT EACH LOCATION  
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

CYLINDER + NO. 60 MESH SCREEN

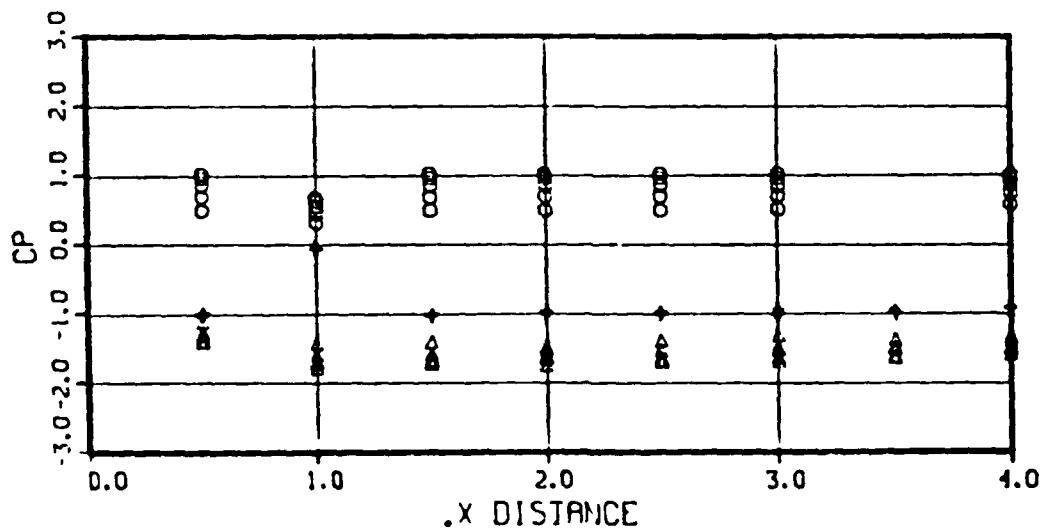
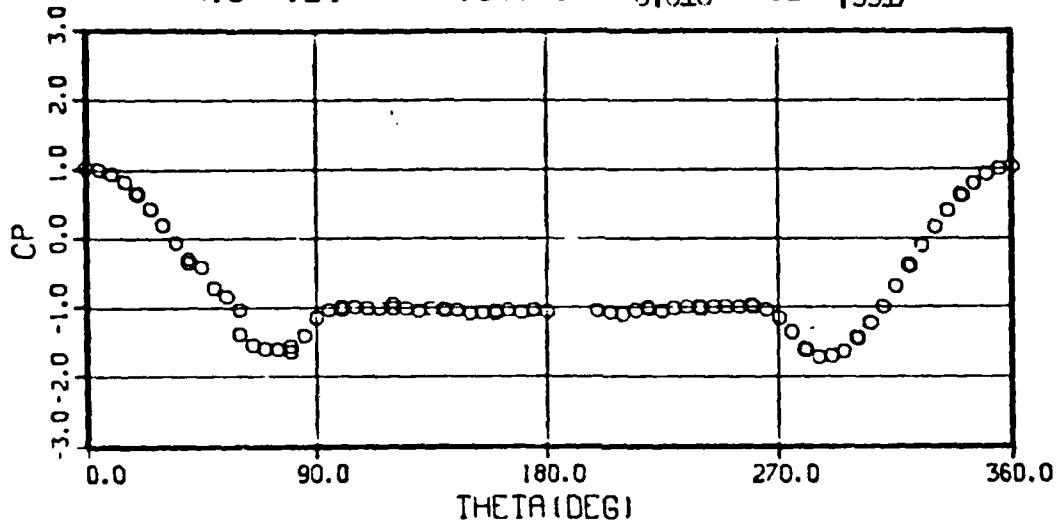
RUN 235 OIU- 74.7 +/- 74.74 RND1U-1.432 +/- \*\*\*\*  
 PIU- 1756. +/- 1755.60 VIU-224.71 +/- \*\*\*\*\*  
 MIU- .197 +/- .197 CL- 0.0412 CD- .9476



CP VALUES ALONG LONGITUDINAL RAYS AT  
 POLAR ANGLE OF 4DEG-0 64DEG-+ 124DEG-X.  
 THE 5 SETS OF POINTS AT EACH LOCATION  
 CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

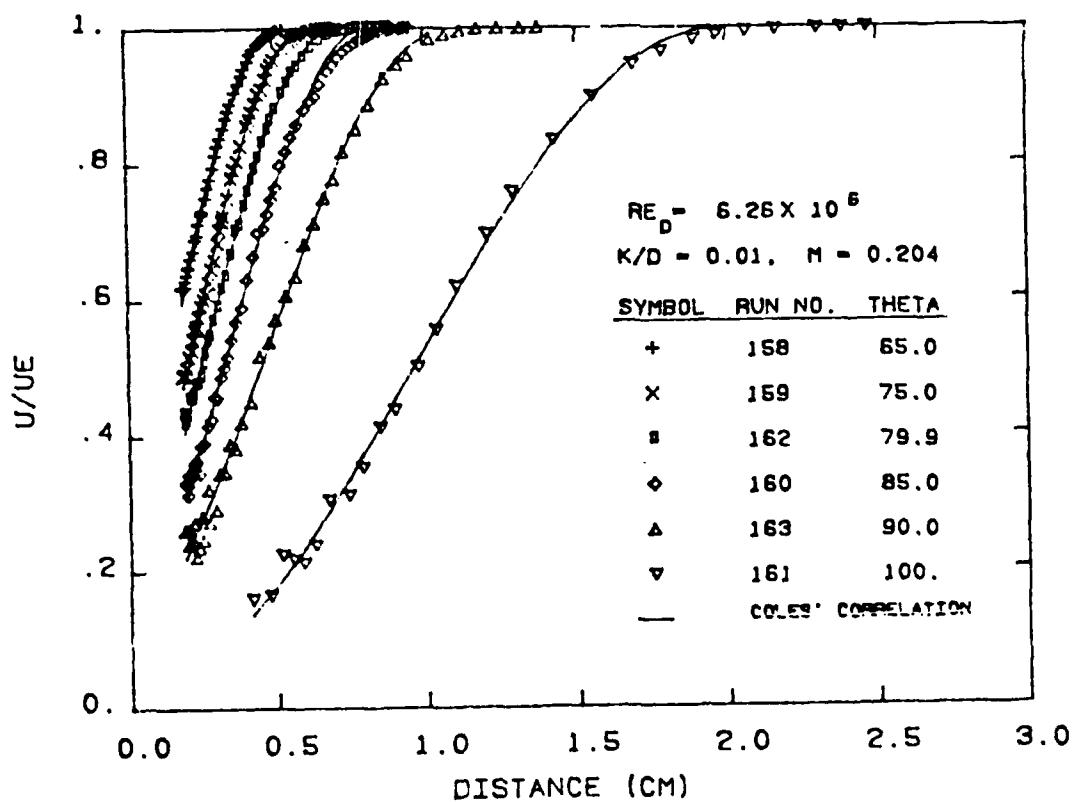
CYLINDER + NO. 60 MESH SCREEN

RUN 236 O1U-108.0 +/- .52 RNDIU-2.056 +/- .004  
 PIU- 2519. +/- 6.00 VIU-282.16 +/- .782  
 MIU- .247 +/- .001 CL- 0.016 CD- .9917

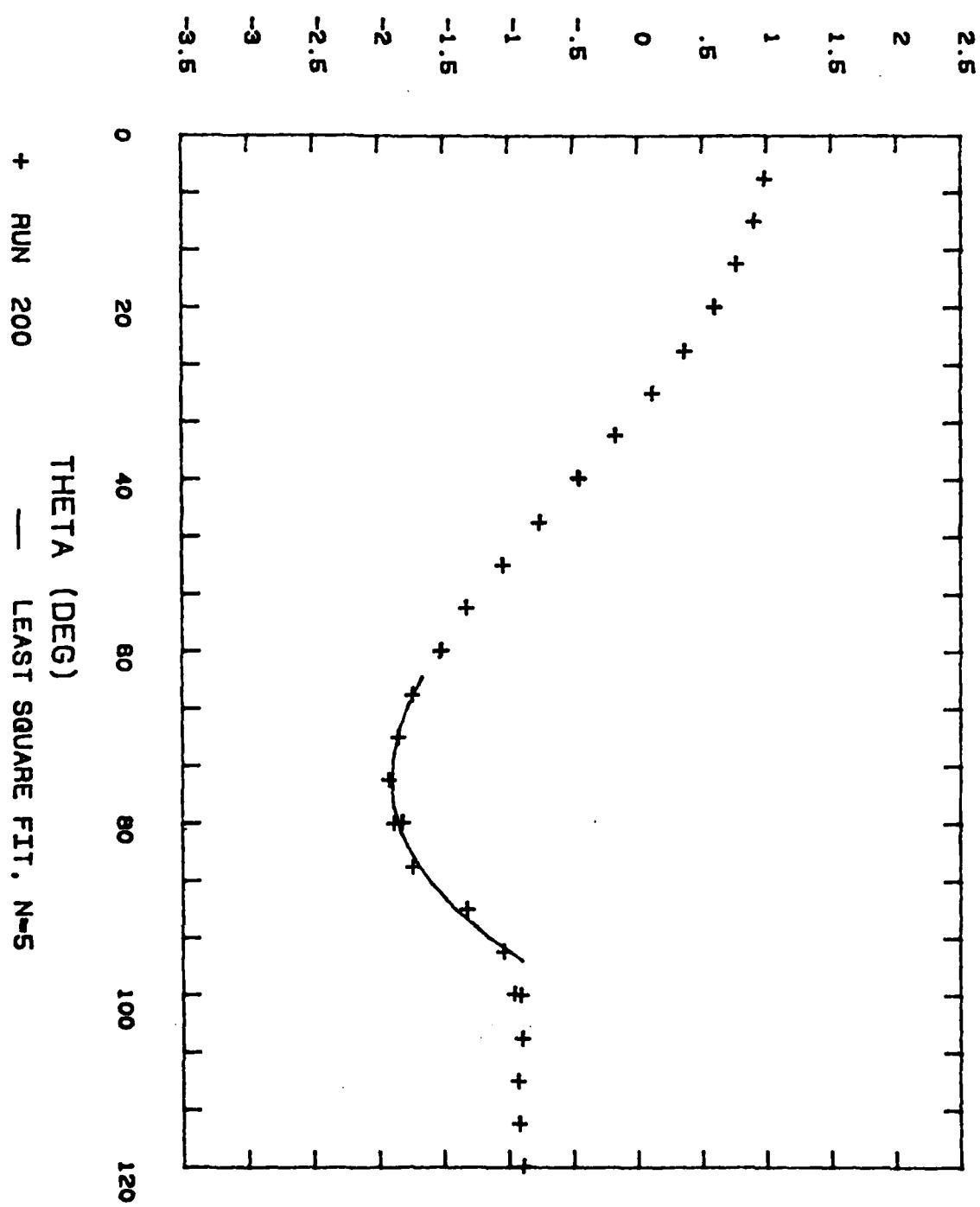


CP VALUES ALONG LONGITUDINAL RAYS AT  
 POLAR ANGLE OF 40DEG-0 64DEG-+ 124DEG-X.  
 THE 5 SETS OF POINTS AT EACH LOCATION  
 CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

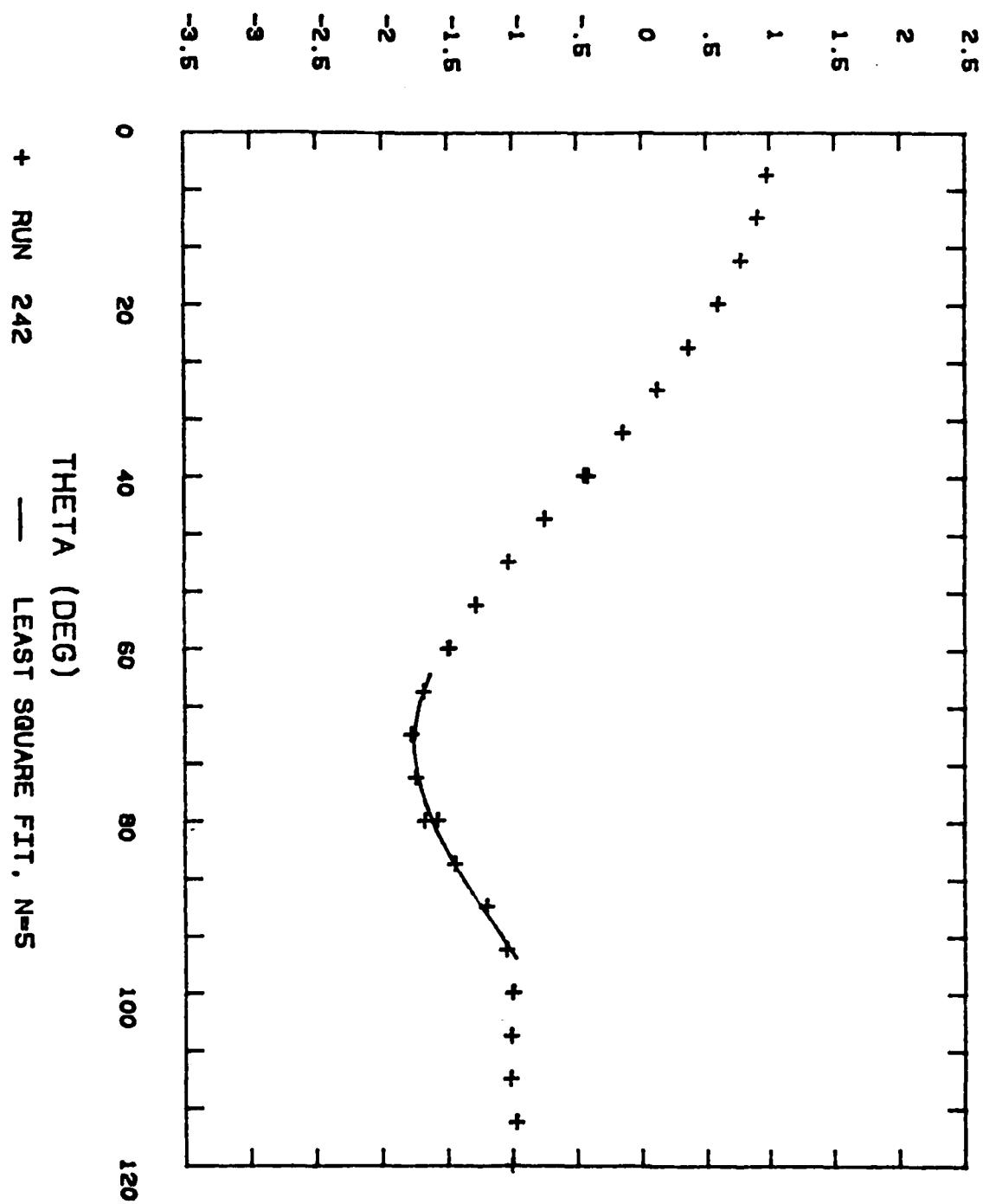
PHI	6.500E+01	7.500E+01	7.999E+01	8.501E+01	9.005E+01	1.002E+02
RUN	158	159	162	160	163	161
RE	6.279E+06	6.243E+06	6.234E+06	6.175E+06	6.298E+06	6.277E+06
M	2.039E-01	2.047E-01	2.047E-01	2.045E-01	2.042E-01	2.043E-01
K/D	1.000E-02	1.000E-02	1.000E-02	1.000E-02	1.000E-02	1.000E-02
UI	7.109E+01	7.148E+01	7.187E+01	7.153E+01	7.167E+01	7.166E+01
UE	1.089E+02	1.126E+02	1.131E+02	1.097E+02	1.073E+02	1.046E+02
NU	3.580E-06	3.620E-06	3.650E-06	3.670E-06	3.600E-06	3.610E-06
RESID	6.800E-03	7.100E-03	8.200E-03	1.010E-02	1.860E-02	1.550E-02
YMIN	1.836E-01	1.862E-01	1.887E-01	1.913E-01	1.887E-01	4.173E-01
YMAX	3.866E-01	4.630E-01	5.494E-01	6.256E-01	8.237E-01	1.560E+00
PI	3.978E-01	1.072E+00	1.486E+00	2.828E+00	4.141E+00	3.583E+01
DU*	2.133E+01	2.056E+01	2.014E+01	1.915E+01	1.846E+01	1.390E+01
R+	1.040E+04	7.580E+03	6.380E+03	4.250E+03	3.210E+03	4.940E+02
DELTA	4.894E-01	5.894E-01	6.868E-01	8.005E-01	1.069E+00	1.973E+00
CF	5.500E-02	2.950E-02	2.100E-02	9.500E-03	5.200E-03	1.000E-04
U*	1.179E+01	8.679E+00	7.356E+00	4.924E+00	3.649E+00	5.640E-01
DEL*	8.540E-02	1.331E-01	1.734E-01	2.390E-01	3.586E-01	7.418E-01
THETA	5.950E-02	8.050E-02	9.820E-02	1.191E-01	1.591E-01	2.676E-01
B	1.436E+00	1.653E+00	1.766E+00	2.007E+00	2.254E+00	2.772E+00
RTHETA	1.810E+04	2.500E+04	3.040E+04	3.570E+04	4.740E+04	7.750E+04
BETA	-1.288E-01	1.022E-01	4.681E-01	1.969E+00	6.014E+00	3.954E+02

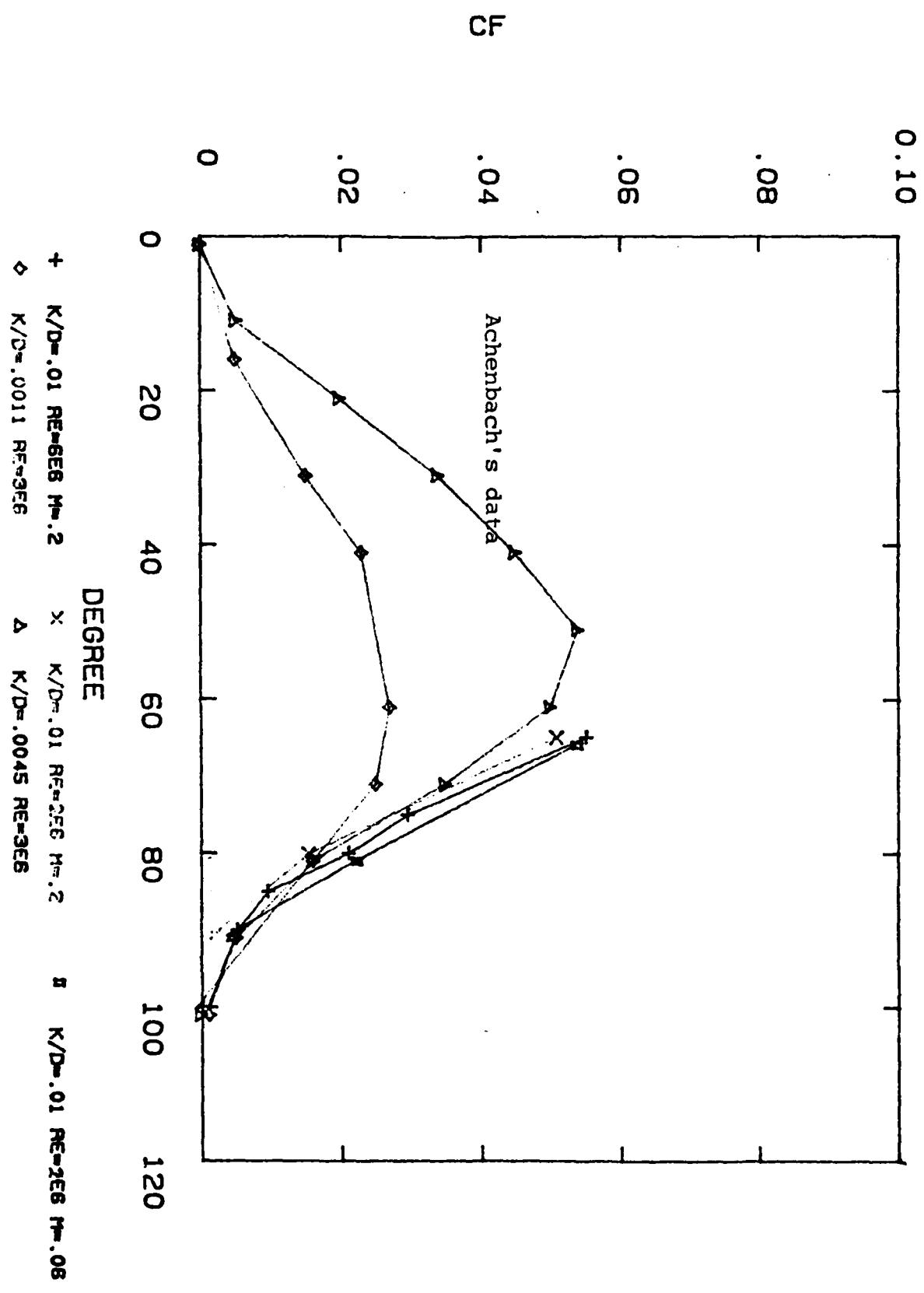


CP1U



CP1U





## PART II

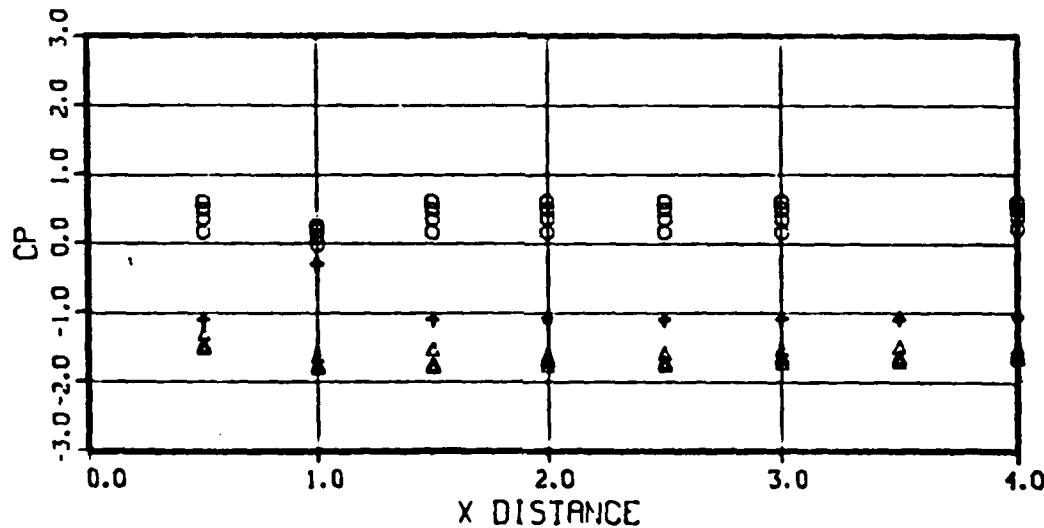
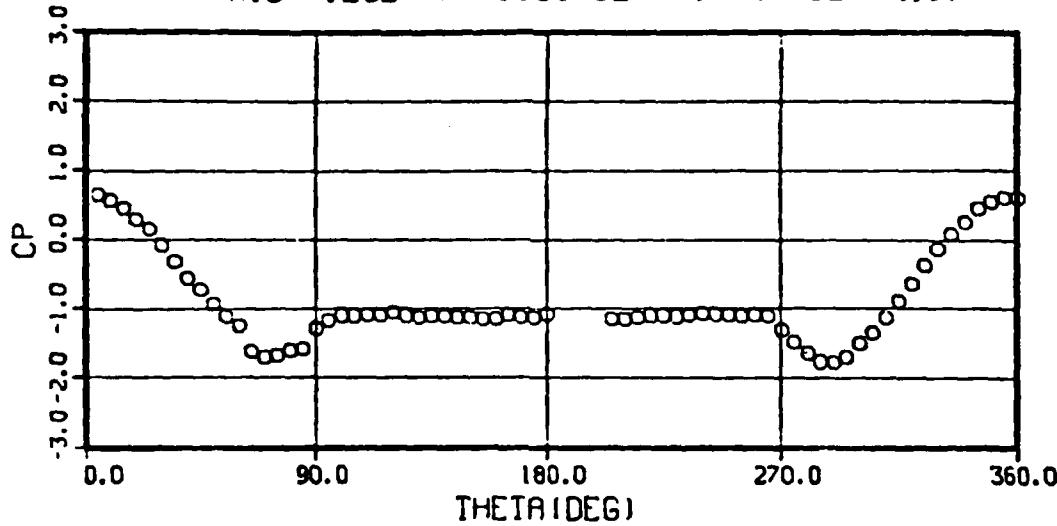
### BOUNDARY LAYER PROFILES

Part II consists of plots and analysis of boundary layer profiles performed by PRi. Data analysis on the boundary layer profiles consists of determining the applicability of conventional similarity laws to smooth and rough cylinder turbulent boundary layers. This is accomplished by casting the data in terms of the law-of-the-wall and law-of-the-wake similarity laws.

APPENDIX C  
BOUNDARY LAYER PROFILES  
AND DATA

CYLINDER + NO. 60 MESH SCREEN

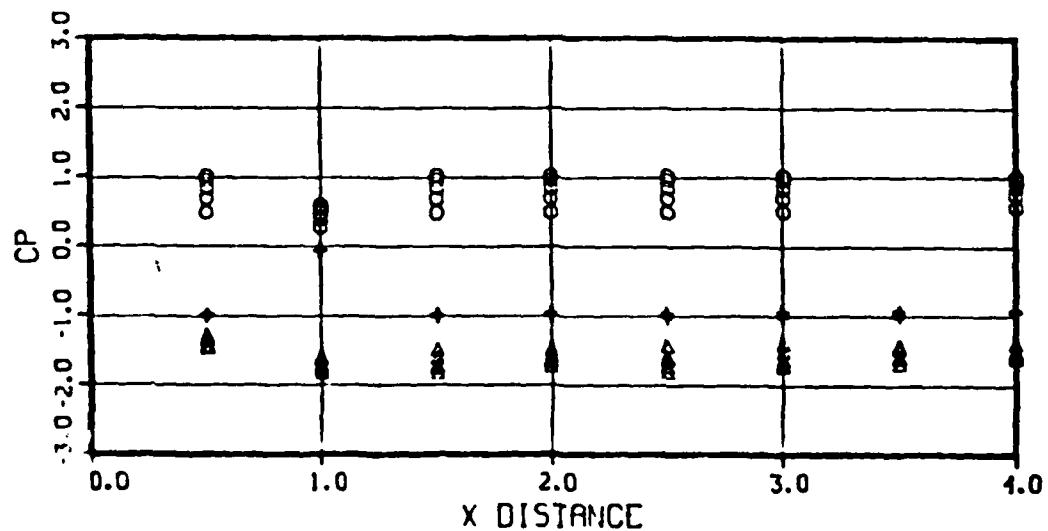
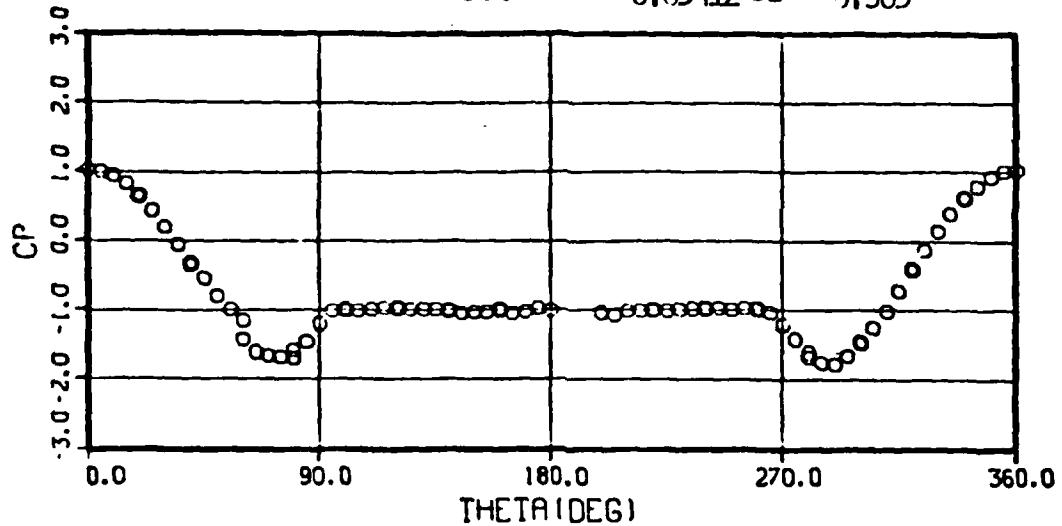
RUN 244 OIU-270.8 +/- 1.00 RNDIU-5.991 +/- .015  
PIU- 9426. +/- 20.50 VIU-235.63 +/- .500  
MIU- .202 +/- .001 CL- 0.0329 CD- 0.84



CP VALUES ALONG LONGITUDINAL RAYS AT  
POLAR ANGLE OF 4DEG-0 64DEG-+ 124DEG-X.  
THE 5 SETS OF POINTS AT EACH LOCATION  
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

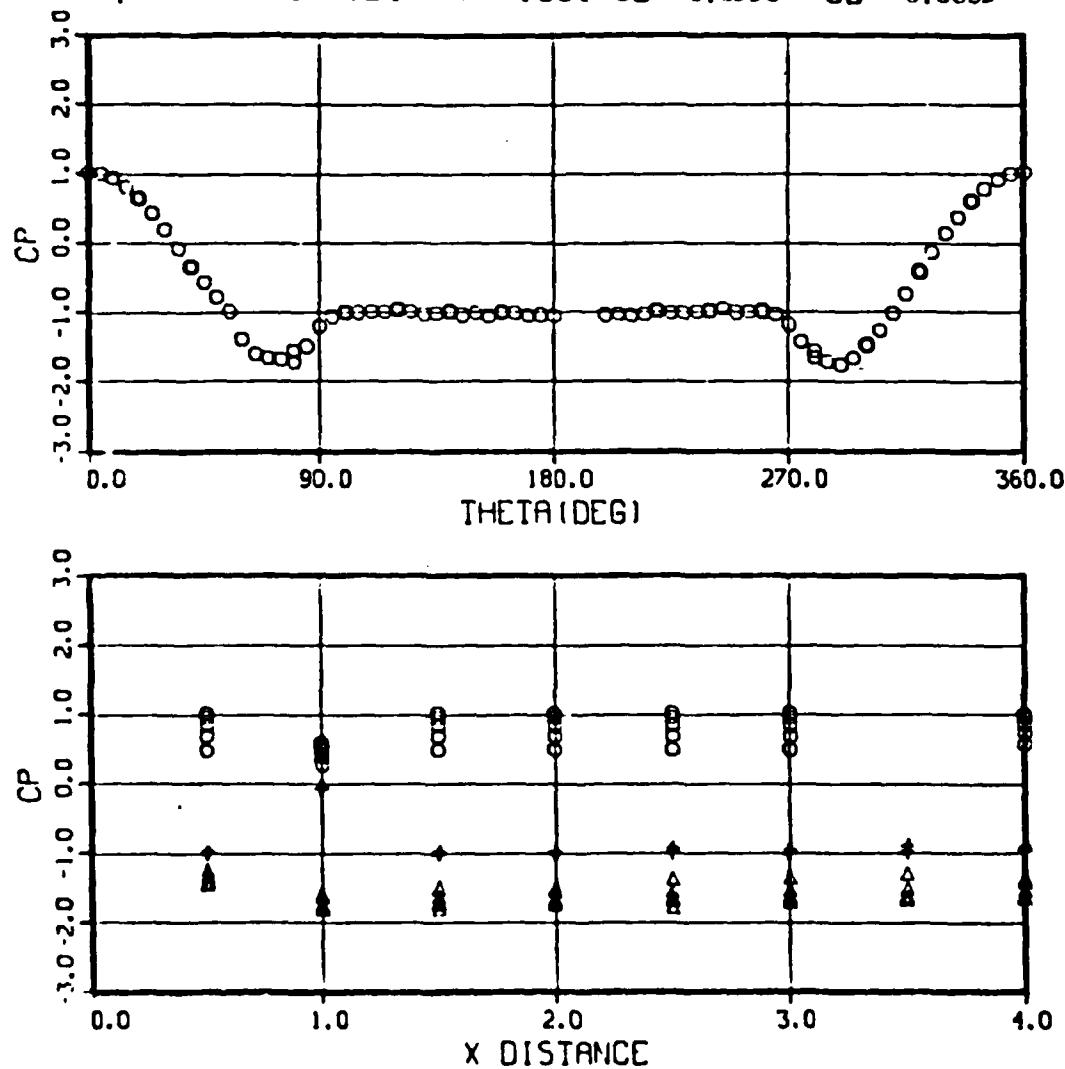
CYLINDER + NO. 60 MESH SCREEN

RUN 243 OIU-405.0 +/- 2.16 RNDIU-7.297 +/- .034  
 PIU- 9440. +/- 12.40 VIIU-288.51 +/- .794  
 MIU- .247 +/- .001 CL- "0.03412 CD- 0.965



CP VALUES ALONG LONGITUDINAL RAYS AT  
 POLAR ANGLE OF 40DEG-0 64DEG-- 124DEG-X.  
 THE 5 SETS OF POINTS AT EACH LOCATION  
 CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

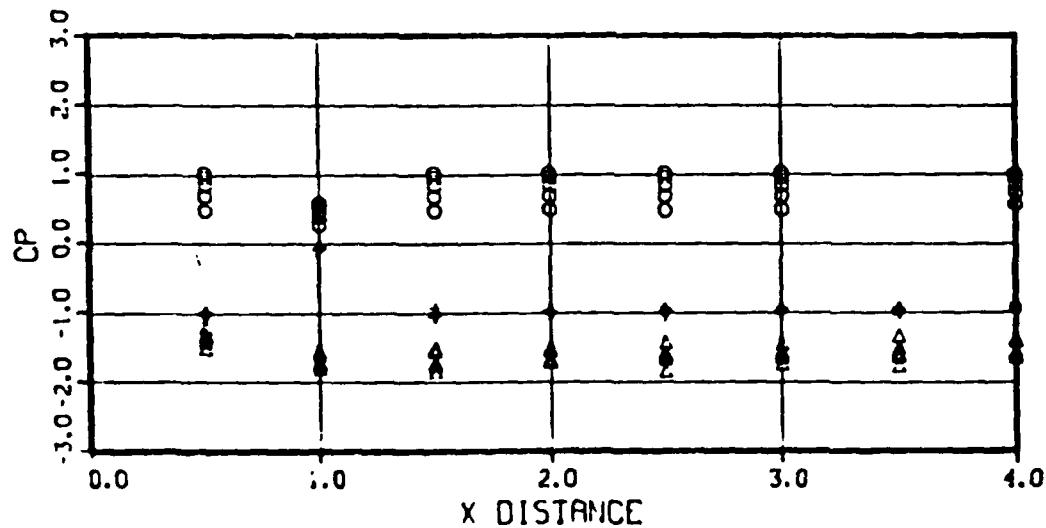
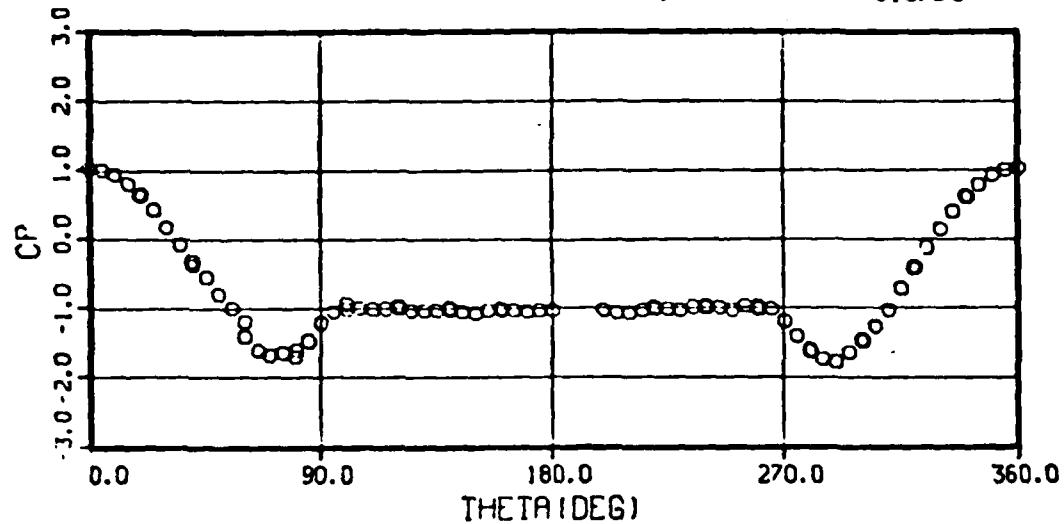
CYLINDER + NO. 60 MESH SCREEN  
RUN 242 OIU-334.3 +/- 2.62 RNDIU-6.121 +/- .025  
PIU- 7827. +/- 4.00 VIU-285.29 +/- 1.118  
MIU- .247 +/- .001 CL- 0.0359 CD- 0.9693



CP VALUES ALONG LONGITUDINAL RAYS AT  
POLAR ANGLE OF 40DEG-0 640DEG-+ 1240DEG-X.  
THE 5 SETS OF POINTS AT EACH LOCATION  
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

CYLINDER • NO. 60 MESH SCREEN

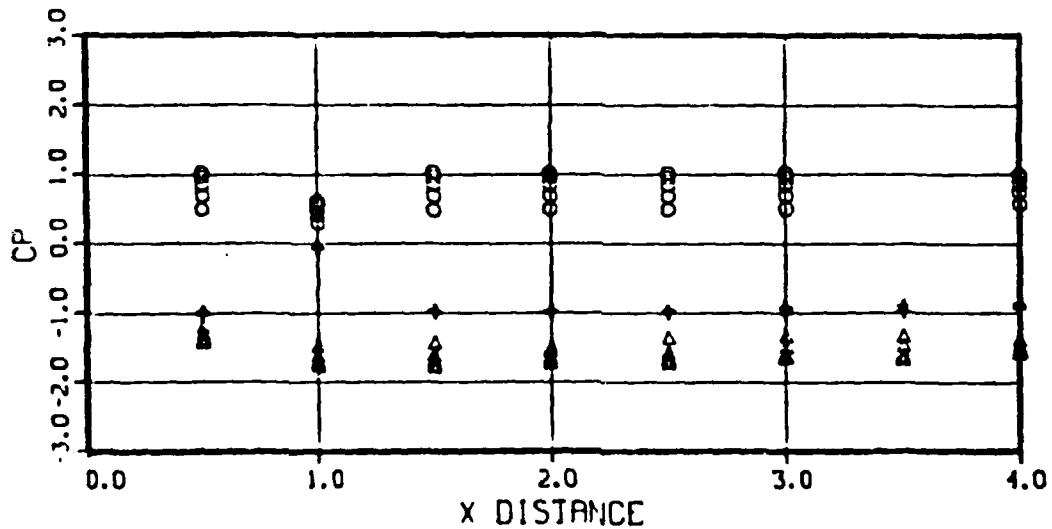
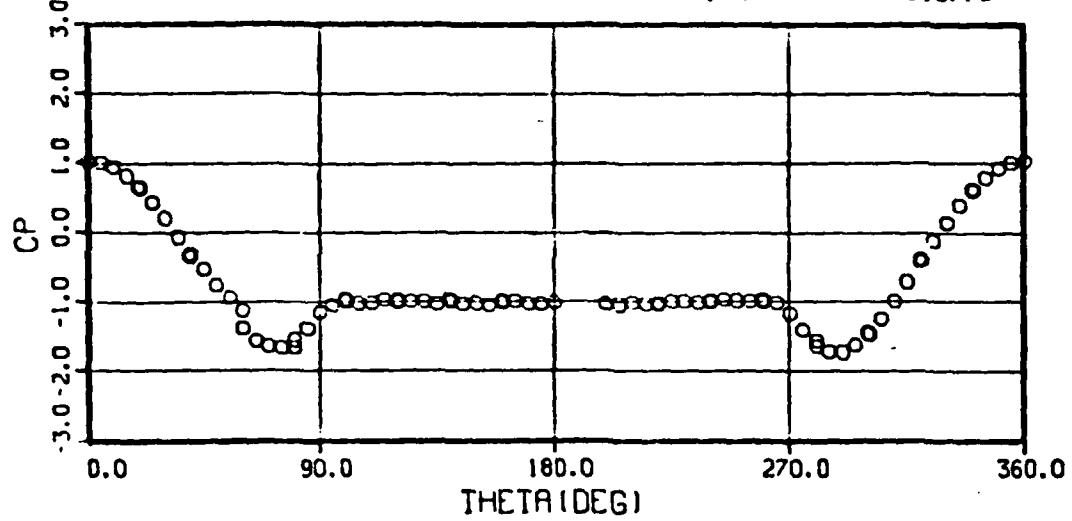
RUN 241 CIU-275.2 +/- 2.48 RNDIU-5.097 +/- .030  
 PIU- 6454. +/- 14.20 VIU-284.81 +/- .946  
 MIU- .247 +/- .001 CL- 0.0294 CD- 0.9736



CP VALUES ALONG LONGITUDINAL RAYS AT  
 POLAR ANGLE OF 40DEG-0 64DEG-+ 124DEG-X.  
 THE 5 SETS OF POINTS AT EACH LOCATION  
 CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

CYLINDER • NO. 60 MESH SCREEN

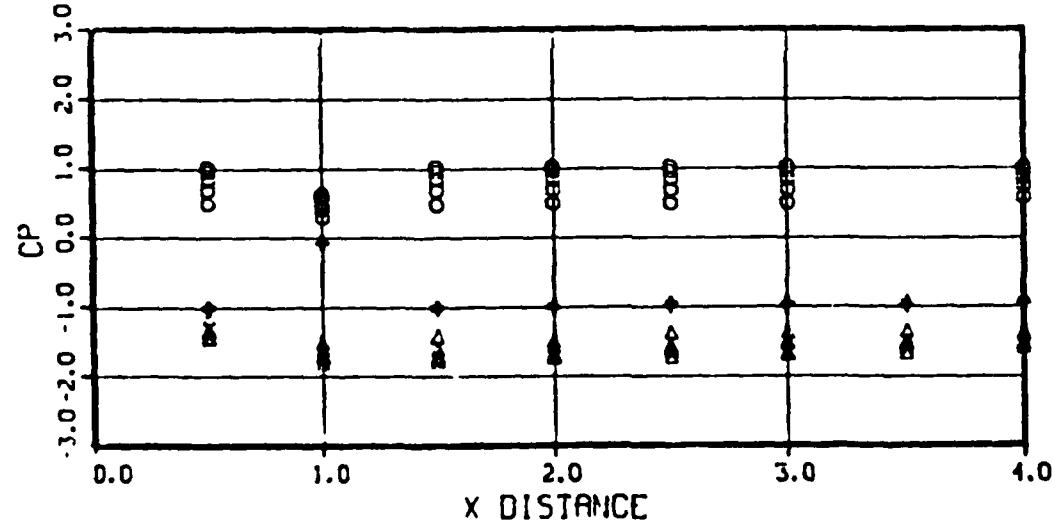
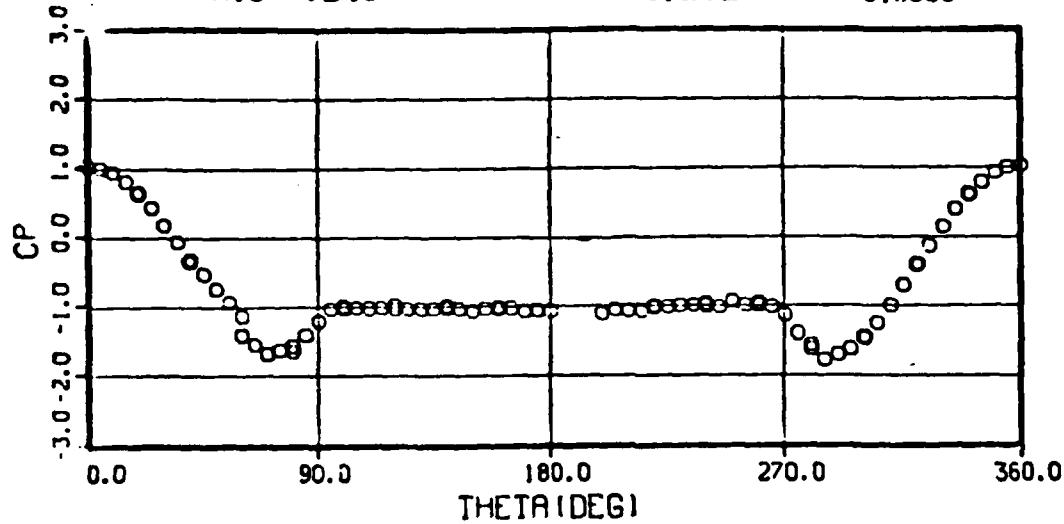
RUN 240 OIU-220.1 +/- 2.02 RNDIU-4.114 +/- .016  
PIU- 5155. +/- 4.40 VIU-283.91 +/- 1.424  
MIU- .247 +/- .001 CL- 0.0479 CD- 0.9773



CP VALUES ALONG LONGITUDINAL RAYS AT  
POLAR ANGLE OF 40DEG-0 64DEG-- 124DEG-X.  
THE 5 SETS OF POINTS AT EACH LOCATION  
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

CYLINDER + NO. 60 MESH SCREEN

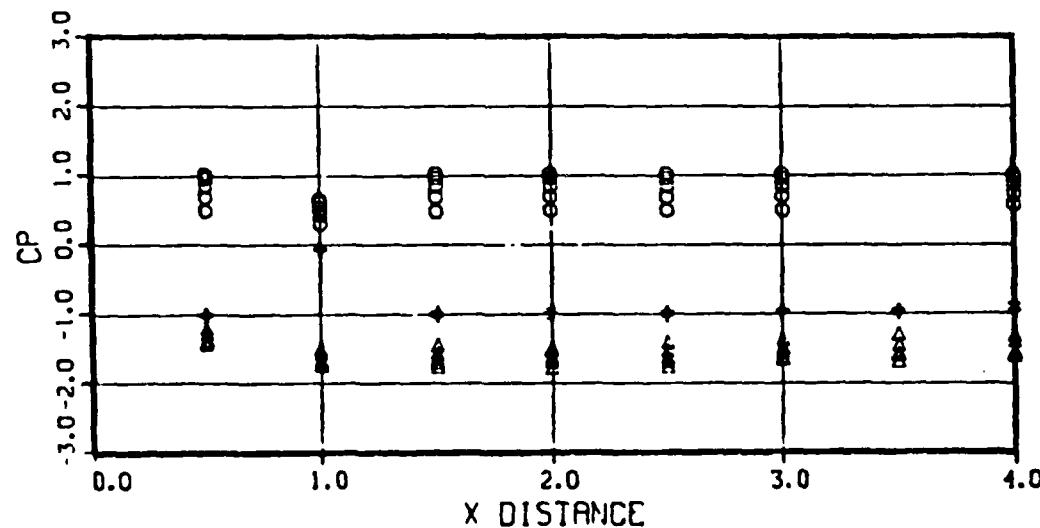
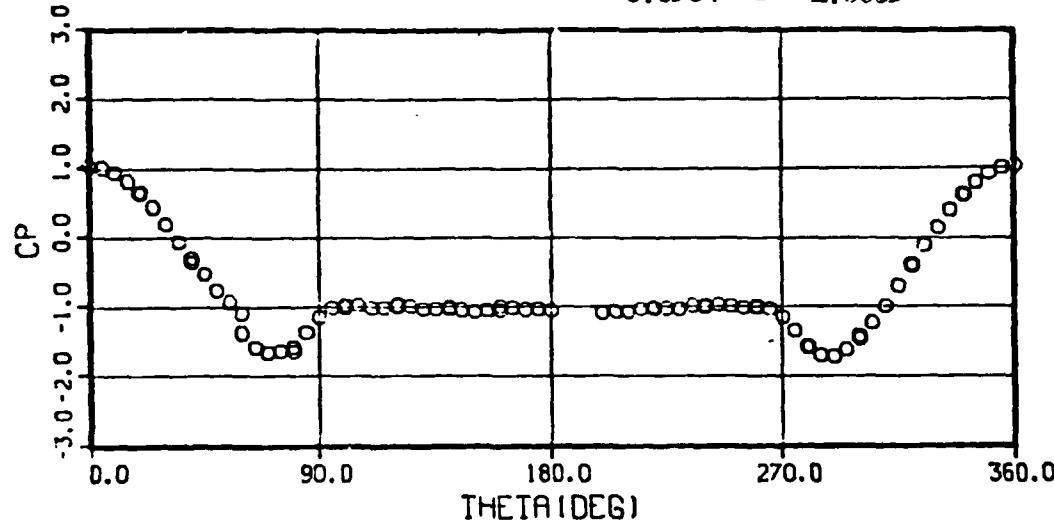
RUN 239 O1U-191.0 +/- 1.42 RND1U-3.595 +/- .016  
P1U- 4484. +/- 8.80 V1U-282.92 +/- .936  
M1U- .246 +/- .001 CL- 0.0352 CO- 0.9998



CP VALUES ALONG LONGITUDINAL RAYS AT  
POLAR ANGLE OF 4DEG-0 64DEG-+ 124DEG-X.  
THE 5 SETS OF POINTS AT EACH LOCATION  
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

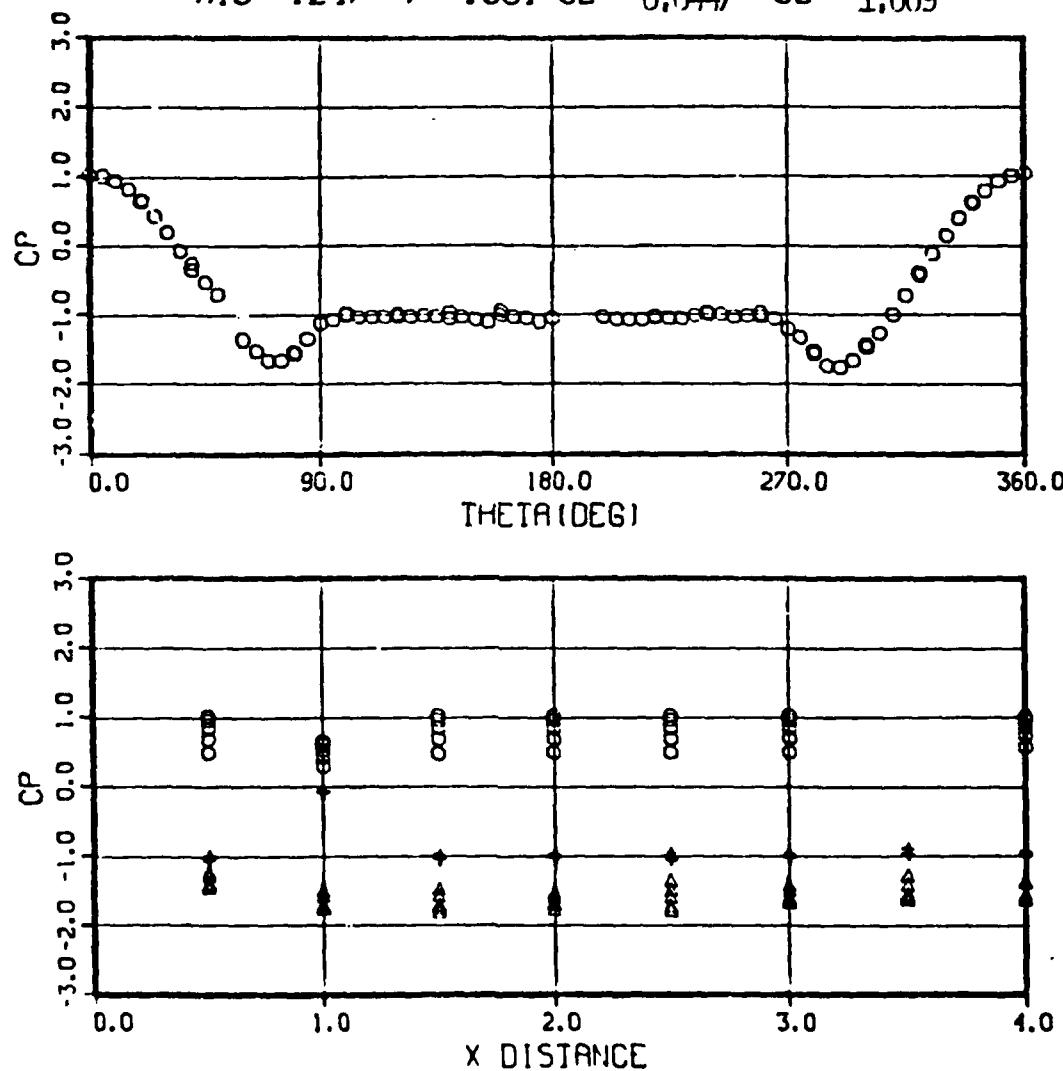
CYLINDER + NO. 60 MESH SCREEN

RUN 238 QIU-164.2 +/- 1.36 RNDIU-3.089 +/- .013  
PIU- 3818. +/- 4.60 VIU-283.77 +/- 1.178  
MIU- .248 +/- .001 CL- - 0.0364 CD- 1.0003

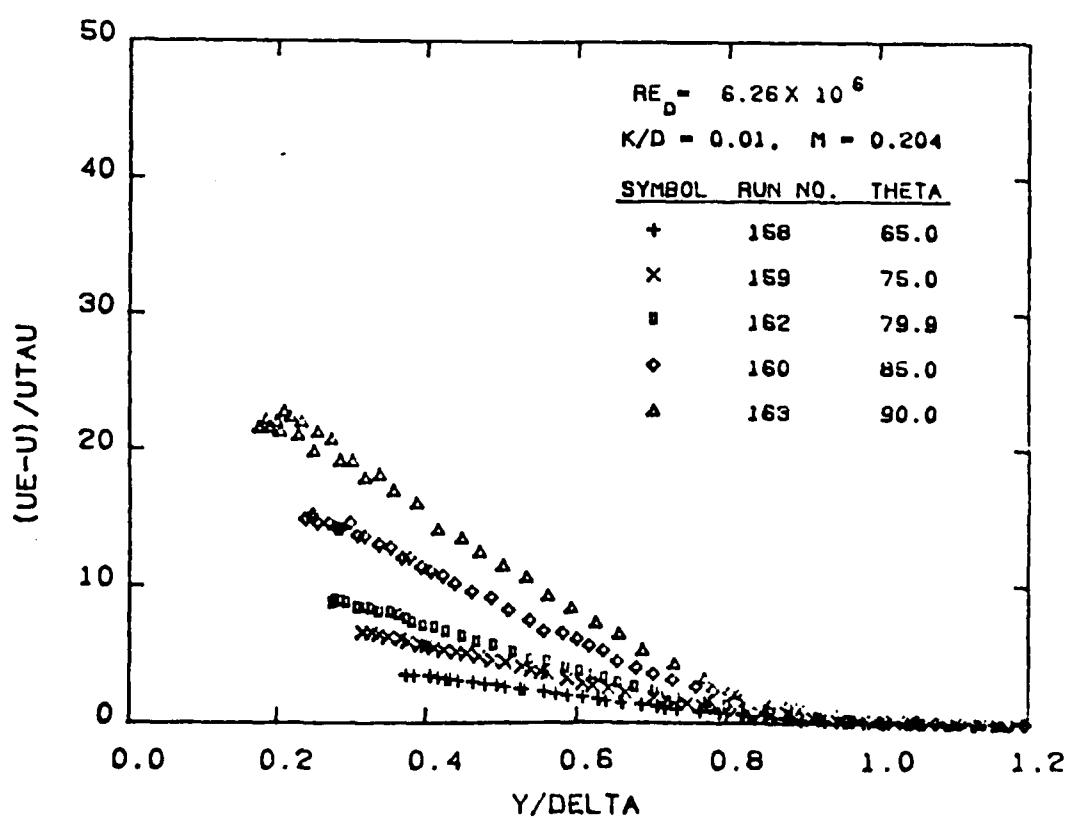
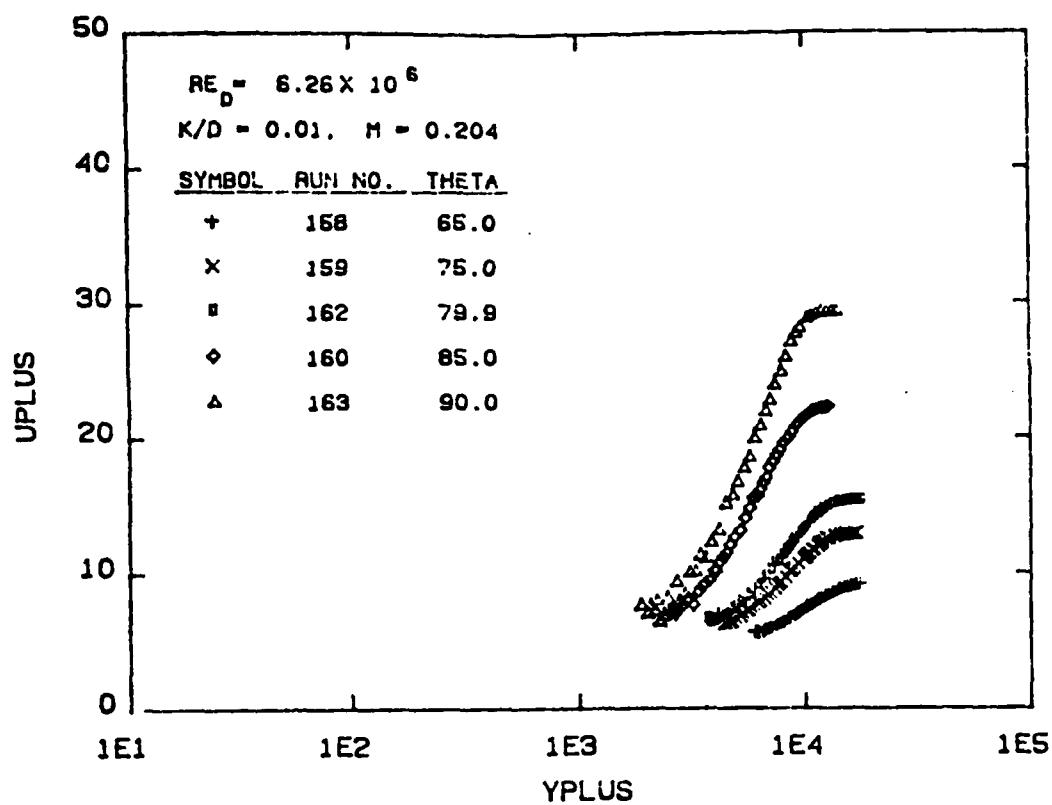


CP VALUES ALONG LONGITUDINAL RAYS AT  
POLAR ANGLE OF 4DEG-0 64DEG-+ 124DEG-X.  
THE 5 SETS OF POINTS AT EACH LOCATION  
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.

CYLINDER + NO. 60 MESH SCREEN  
RUN 237 OIU-135.8 +/- .94 RNDIU-2.580 +/- .015  
PIU- 3185. +/- 18.60 VIU-281.94 +/- 1.812  
MIU- .247 +/- .001 CL- 0.0447 CD- 1.009



CP VALUES ALONG LONGITUDINAL RAYS AT  
POLAR ANGLE OF 4DEG-0 64DEG-+ 124DEG-X.  
THE 5 SETS OF POINTS AT EACH LOCATION  
CORRESPOND TO 4 ROLLS OF 5 DEG. EACH.



BDR 298

T(CH)	D/DZ	T*	D*	T/DELTA	DDDF
0.184	0.619	6047.46	5.718	0.375	3.515
0.185	0.610	6214.75	5.767	0.386	3.526
0.199	0.621	6549.33	5.736	0.406	3.497
0.199	0.629	6549.33	5.810	0.406	3.423
0.204	0.630	6716.62	5.893	0.417	3.341
0.209	0.648	6883.90	5.984	0.427	3.250
0.212	0.650	6967.55	6.001	0.432	3.232
0.217	0.662	7134.84	6.111	0.443	3.123
0.227	0.673	7469.41	6.215	0.463	3.019
0.234	0.680	7720.35	6.367	0.479	2.866
0.242	0.696	7971.20	6.426	0.495	2.807
0.247	0.713	8136.56	6.582	0.505	2.651
0.257	0.727	8473.14	6.715	0.526	2.518
0.260	0.731	8554.76	6.753	0.531	2.480
0.273	0.751	8975.01	6.930	0.557	2.295
0.280	0.766	9225.94	7.075	0.572	2.159
0.288	0.778	9476.87	7.187	0.588	2.046
0.298	0.795	9811.45	7.343	0.609	1.891
0.308	0.814	10146.02	7.524	0.630	1.719
0.313	0.827	10333.31	7.639	0.640	1.591
0.323	0.838	10647.89	7.742	0.661	1.492
0.336	0.854	11066.11	7.887	0.687	1.347
0.346	0.866	11406.46	8.014	0.707	1.219
0.351	0.875	11567.97	8.115	0.716	1.119
0.359	0.880	11818.90	8.214	0.733	1.020
0.374	0.906	12320.77	8.367	0.764	0.867
0.387	0.910	12730.99	8.479	0.790	0.754
0.402	0.933	13240.85	8.595	0.822	0.639
0.407	0.943	13400.14	8.692	0.832	0.541
0.422	0.952	13910.00	8.793	0.863	0.462
0.430	0.963	14166.94	8.889	0.879	0.344
0.440	0.969	14495.51	8.952	0.895	0.282
0.455	0.977	14997.38	9.021	0.931	0.215
0.468	0.982	15415.60	9.064	0.957	0.169
0.481	0.987	15833.82	9.114	0.982	0.119
0.494	0.992	16250.04	9.163	1.006	0.072
0.509	0.991	16753.95	9.182	1.040	0.045
0.516	0.997	17064.83	9.210	1.055	0.023
0.534	0.995	17550.34	9.228	1.091	0.005

BDR 299

T(CH)	D/DZ	T*	D*	T/DELTA	DDDF
0.186	0.490	4463.84	6.353	0.316	6.621
0.196	0.492	4646.54	6.379	0.329	6.595
0.199	0.501	4768.33	6.491	0.337	6.476
0.207	0.518	4951.03	6.721	0.350	6.253
0.217	0.527	5194.62	6.836	0.368	6.130
0.222	0.544	5336.42	7.057	0.376	6.017
0.232	0.557	5560.01	7.232	0.393	5.747
0.237	0.563	5681.01	7.301	0.402	5.672
0.242	0.577	5803.60	7.485	0.413	5.629
0.250	0.593	5984.30	7.690	0.424	5.284
0.260	0.602	6229.89	7.811	0.441	5.163
0.267	0.613	6412.59	7.922	0.454	5.053
0.276	0.627	6656.10	8.131	0.471	4.842
0.288	0.647	6895.77	8.397	0.486	4.576
0.298	0.660	7143.37	8.561	0.506	4.413
0.311	0.684	7467.86	8.880	0.527	4.094
0.318	0.704	7630.35	9.131	0.540	3.842
0.326	0.717	7813.25	9.306	0.553	3.668
0.331	0.723	7955.04	9.385	0.562	3.586
0.346	0.750	8300.43	9.735	0.587	3.238
0.359	0.781	8604.92	10.130	0.609	2.844
0.367	0.793	8767.62	10.292	0.622	2.662
0.379	0.804	9020.31	11.435	0.643	2.539
0.392	0.828	9396.60	12.745	0.665	2.229
0.415	0.857	9944.68	13.119	0.704	1.855
0.425	0.866	10186.28	13.237	0.721	1.737
0.430	0.877	10310.07	13.361	0.730	1.593
0.440	0.889	10552.67	13.528	0.747	1.436
0.453	0.904	10858.16	13.725	0.768	1.249
0.463	0.913	11301.75	14.023	0.786	1.151
0.478	0.925	11467.14	14.204	0.811	0.976
0.488	0.941	11736.73	12.264	0.829	0.770
0.499	0.947	11954.33	12.287	0.846	0.686
0.506	0.955	12137.02	13.387	0.859	0.587
0.524	0.967	12543.32	12.543	0.885	0.433
0.539	0.972	12926.70	13.635	0.915	0.358
0.562	0.982	13476.78	12.745	0.954	0.229
0.575	0.986	13781.28	12.795	0.975	0.175
0.586	0.990	14065.77	12.842	0.987	0.136
0.603	0.993	14453.16	12.879	1.023	0.081
0.621	0.995	14877.45	13.907	1.053	0.046
0.632	0.996	15221.04	13.921	1.070	0.046
0.651	0.997	15608.28	12.911	1.105	0.018
0.669	0.995	16034.53	12.963	1.135	0.011

BDR 162

T(CH)	D/DZ	T*	D*	T/DELTA	DDDF
0.191	0.435	3803.16	6.692	0.275	0.698
0.191	0.419	3954.32	6.443	0.278	0.927
0.196	0.425	3956.69	6.527	0.286	0.843
0.201	0.431	4059.07	6.630	0.293	0.740
0.212	0.456	4263.81	7.007	0.308	0.363
0.219	0.454	4417.37	6.982	0.319	0.388
0.224	0.452	4539.74	7.101	0.327	0.269
0.232	0.477	4673.30	7.339	0.338	0.031
0.242	0.478	4978.05	7.345	0.352	0.025
0.250	0.489	5031.61	7.511	0.364	7.059
0.257	0.508	5185.16	7.602	0.375	7.566
0.263	0.524	5287.54	8.059	0.382	7.311
0.273	0.541	5492.28	8.320	0.397	7.050
0.283	0.549	5697.03	8.499	0.412	6.933
0.293	0.571	5911.77	8.777	0.426	6.593
0.308	0.592	6208.89	9.106	0.449	6.264
0.321	0.610	6414.82	9.301	0.467	5.069
0.336	0.636	6771.94	9.701	0.489	5.589
0.354	0.668	7130.24	10.261	0.515	3.109
0.369	0.703	7477.36	10.803	0.537	4.569
0.384	0.731	7744.48	10.921	0.560	4.448
0.402	0.740	8102.76	11.372	0.595	3.998
0.415	0.760	8350.71	11.603	0.604	3.686
0.427	0.770	8614.64	11.954	0.622	3.416
0.438	0.794	8819.39	12.201	0.637	3.169
0.450	0.811	9075.32	12.460	0.656	2.909
0.466	0.833	9382.43	12.798	0.678	2.572
0.483	0.851	9740.76	13.078	0.704	2.192
0.494	0.865	9945.48	13.296	0.719	2.074
0.509	0.882	10252.60	13.554	0.741	3.816
0.532	0.905	10713.28	13.913	0.774	1.457
0.549	0.920	11071.56	14.144	0.800	1.226
0.567	0.935	11429.88	14.373	0.826	0.997
0.585	0.945	11700.39	14.520	0.852	0.910
0.605	0.956	12197.68	14.725	0.881	0.645
0.633	0.971	12760.72	14.929	0.921	0.441
0.644	0.982	13374.96	15.097	0.946	0.274
0.664	0.990	13989.19	15.209	1.011	0.161
0.672	0.994	14552.24	15.200	1.051	0.089
0.745	0.997	15012.92	15.316	1.085	0.054
0.765	0.998	15422.43	15.345	1.114	0.025

BDR 160

T(CH)	D/DZ	T*	D*	T/DELTA	DDDF
0.191	0.332	2565.99	7.395	0.239	14.852
0.199	0.328	2666.22	7.301	0.248	14.889
0.199	0.315	2668.22	7.018	0.248	15.272
0.204	0.345	2736.37	7.685	0.255	14.605
0.217	0.344	2906.75	7.671	0.271	14.619
0.224	0.360	3008.98	8.028	0.286	14.243
0.229	0.364	3077.14	8.103	0.287	14.187
0.240	0.345	3213.45	7.697	0.299	14.593
0.247	0.387	3315.00	8.119	0.309	13.671
0.255	0.389	3417.91	8.680	0.318	13.610
0.270	0.416	3622.37	8.277	0.337	13.013
0.283	0.425	3792.75	9.474	0.353	12.817
0.295	0.459	3943.24	10.225	0.369	12.065
0.303	0.487	4065.37	10.377	0.379	12.113
0.316	0.487	4235.75	10.863	0.394	11.427
0.326	0.501	4372.06	11.172	0.407	11.210
0.339	0.517	4542.44	11.525	0.423	10.765
0.351	0.543	4712.03	12.099	0.439	10.191
0.369	0.569	4951.36	12.476	0.461	9.612
0.407	0.631	5233.92	13.350	0.486	9.140
0.430	0.665	5769.21	14.813	0.537	7.478
0.445	0.701	5973.67	15.616	0.556	6.674
0.466	0.705	6246.28	15.715	0.582	6.575
0.481	0.727	6450.74	16.203		

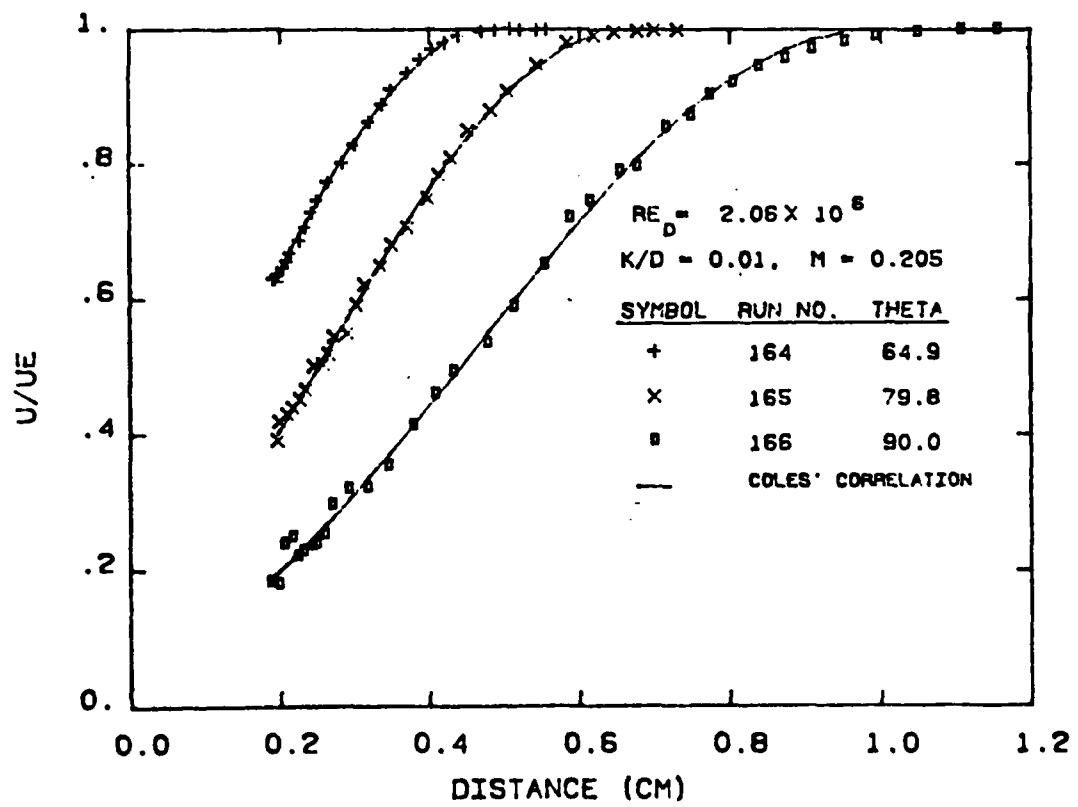
RUN 163

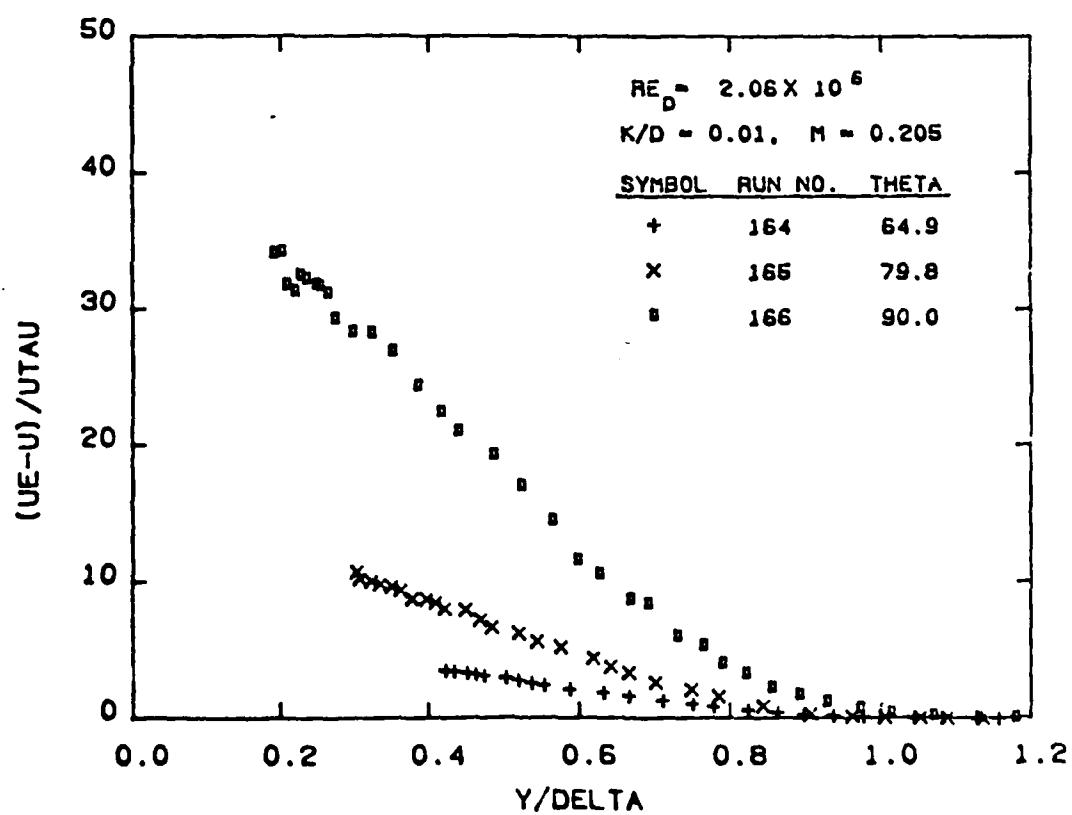
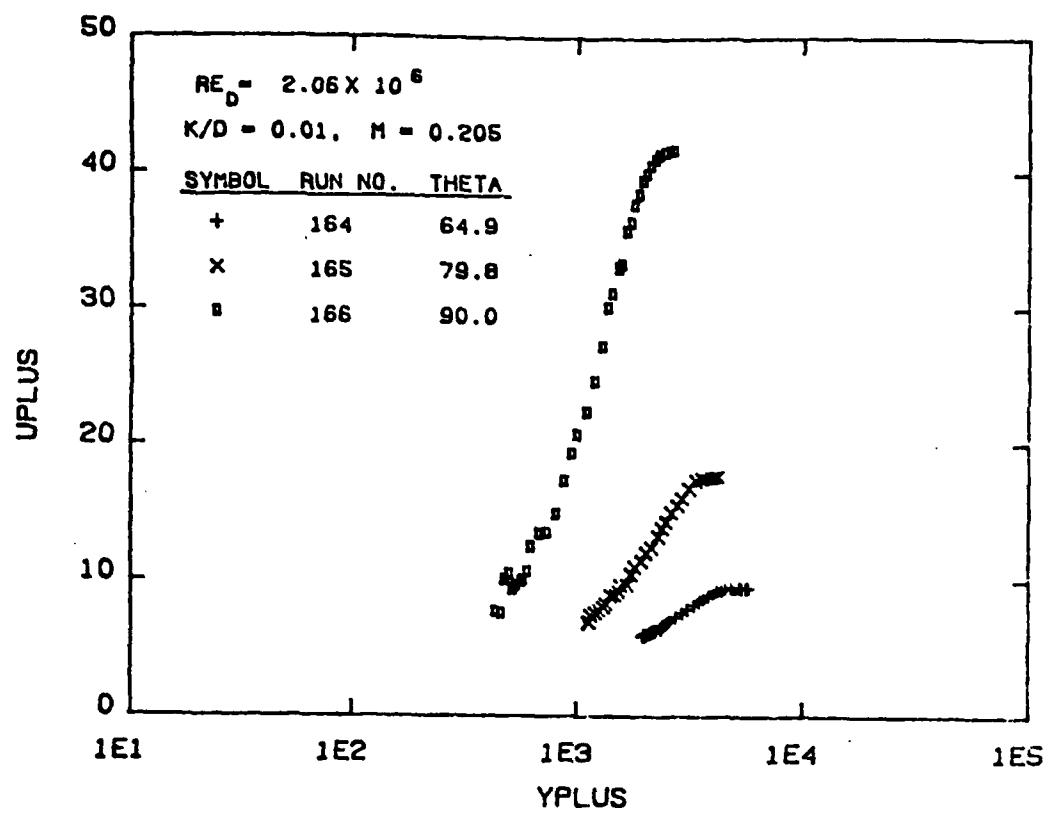
T(CK)	D/DE	V+	D+	V/DELTA	UDEF
0.189	0.263	1912.64	7.723	0.377	21.678
0.195	0.242	2615.61	7.317	0.386	22.283
0.204	0.263	2067.16	7.735	0.391	21.666
0.214	0.245	2170.07	7.316	0.200	22.084
0.219	0.273	2221.55	0.031	0.205	21.370
0.224	0.223	2273.06	6.354	0.230	22.846
0.234	0.236	2376.00	6.949	0.219	22.452
0.245	0.263	2478.97	0.311	0.229	21.089
0.250	0.246	253C.46	7.291	0.234	22.309
0.267	0.323	2710.51	9.454	0.250	19.517
0.273	0.274	2762.14	8.857	0.255	21.344
0.293	0.292	2961.08	8.593	0.274	20.806
0.306	0.346	305C.79	16.167	0.206	19.233
0.323	0.347	3276.98	10.223	0.302	16.386
0.341	0.369	3457.18	31.437	0.319	17.963
0.361	0.382	3863.13	31.237	0.332	16.163
0.382	0.423	3889.05	32.375	0.357	17.026
0.415	0.452	4273.70	33.275	0.388	16.125
0.445	0.532	4512.63	25.233	0.431	14.368
0.478	0.539	4847.24	15.851	0.447	13.550
0.504	0.573	5104.61	16.841	0.473	12.560
0.537	0.608	5429.33	17.876	0.501	11.531
0.570	0.630	5773.97	16.695	0.533	10.711
0.600	0.652	6062.86	26.064	0.561	9.327
0.633	0.713	6407.53	26.548	0.592	8.453
0.665	0.750	6777.92	22.058	0.621	7.343
0.702	0.778	7112.57	25.873	0.656	6.526
0.735	0.618	7447.22	24.644	0.687	5.357
0.783	0.853	7931.58	25.024	0.730	4.277
0.824	0.857	8341.19	21.091	0.770	3.310
0.872	0.920	8637.30	27.232	0.816	2.169
0.916	0.940	9300.46	27.827	0.856	1.574
0.953	0.960	9613.65	26.232	0.892	1.169
1.024	0.981	10332.83	26.928	0.951	0.472
1.073	0.991	10676.52	29.142	1.012	0.219
1.123	0.991	11375.77	29.280	1.051	0.120
1.178	0.999	31957.10	29.376	1.103	0.029

RUN 361

T(CK)	D/DE	V+	D+	V/DELTA	UDEF
0.437	0.160	651.99	28.587	0.212	155.875
0.470	0.165	747.76	30.565	0.242	154.896
0.516	0.225	806.76	41.810	0.262	143.651
0.552	0.235	812.31	40.658	0.280	144.804
0.586	0.213	917.87	39.567	0.298	145.895
0.621	0.240	977.39	44.516	0.317	140.946
0.674	0.307	1052.79	56.917	0.342	124.941
0.740	0.314	1151.97	51.151	0.375	127.310
0.788	0.354	1231.37	65.655	0.400	119.866
0.845	0.413	1321.61	76.572	0.430	105.895
0.857	0.439	1402.00	81.325	0.455	104.137
0.876	0.562	1525.02	93.012	0.495	92.449
1.040	0.557	1624.23	103.232	0.527	82.230
1.106	0.620	1727.41	115.073	0.563	70.385
1.207	0.690	1881.14	129.103	0.612	56.359
1.294	0.755	2021.06	140.737	0.656	44.724
1.433	0.624	2231.35	154.740	0.725	30.723
1.560	0.695	2437.73	166.782	0.791	18.679
1.697	0.545	2652.02	175.310	0.861	31.152
1.794	0.916	2801.82	175.162	0.919	6.300
1.851	0.983	2911.52	162.270	0.962	3.192
1.972	0.925	3081.60	183.455	1.000	3.006
2.066	0.954	3231.35	184.436	1.045	1.026
2.167	0.957	3361.16	184.875	1.099	0.583
2.305	0.958	3600.45	185.136	1.166	0.376
2.386	0.955	3727.43	181.320	1.209	0.141
2.470	1.000	3856.39	185.438	1.252	0.024

PHI	6.498E+01	7.986E+01	8.390E+01
RUN	164	165	166
RE	2.071E+06	2.092E+06	2.084E+06
M	2.036E-01	2.042E-01	2.053E-01
K/D	1.000E-02	1.000E-02	1.000E-02
UI	7.047E+01	7.086E+01	7.115E+01
UE	1.074E+02	1.105E+02	1.055E+02
NU	1.080E-05	1.070E-05	1.080E-05
RESID	4.600E-03	8.300E-03	1.460E-02
YMIN	1.913E-01	1.963E-01	1.887E-01
YMAX	3.513E-01	5.062E-01	7.755E-01
PI	5.070E-01	2.006E+00	6.720E+00
DU*	1.853E+01	1.710E+01	1.488E+01
E+	3.300E+03	1.840E+03	7.400E+02
DELTA	4.505E-01	6.447E-01	9.796E-01
CF	5.080E-02	1.540E-02	2.500E-03
D*	1.123E+01	6.227E+00	2.527E+00
DEL*	7.490E-02	1.660E-01	3.484E-01
THETA	5.250E-02	8.910E-02	1.399E-01
H	1.427E+00	1.863E+00	2.491E+00
HTHETA	5.240E+03	9.190E+03	1.370E+04
BETA	-1.018E-01	5.954E-01	9.906E+00





## RUN 164

Y(CM)	U/UE	Y+	U+	Y/DELTA	UDEF
0.191	0.631	1989.21	6.035	0.425	3.529
0.196	0.636	2042.05	6.085	0.436	3.479
0.204	0.647	2121.30	6.190	0.453	3.374
0.209	0.658	2174.13	6.292	0.464	3.272
0.214	0.669	2226.97	6.403	0.475	3.162
0.227	0.688	2359.05	6.579	0.503	2.985
0.234	0.707	2438.31	6.760	0.520	2.804
0.242	0.730	2517.56	6.981	0.537	2.584
0.250	0.747	2596.81	7.146	0.554	2.418
0.265	0.775	2755.31	7.412	0.588	2.153
0.285	0.803	2966.65	7.682	0.633	1.882
0.300	0.830	3125.15	7.934	0.667	1.630
0.321	0.864	3336.49	8.261	0.712	1.303
0.339	0.890	3521.41	8.508	0.752	1.057
0.351	0.912	3653.50	8.720	0.780	0.844
0.372	0.937	3864.83	8.958	0.825	0.606
0.389	0.956	4049.75	9.146	0.864	0.418
0.405	0.972	4208.26	9.292	0.898	0.272
0.422	0.980	4393.18	9.375	0.938	0.189
0.440	0.991	4578.10	9.478	0.977	0.086
0.471	0.998	4895.10	9.547	1.045	0.017
0.488	1.000	5080.02	9.561	1.084	0.004

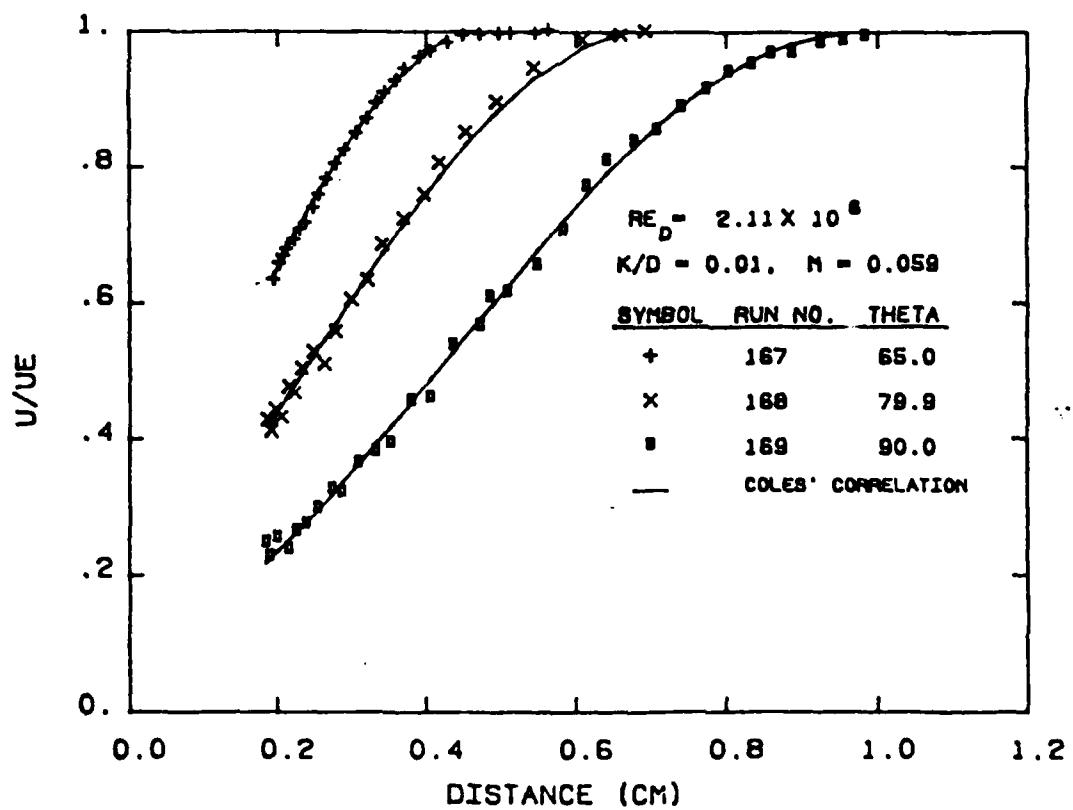
## RUN 165

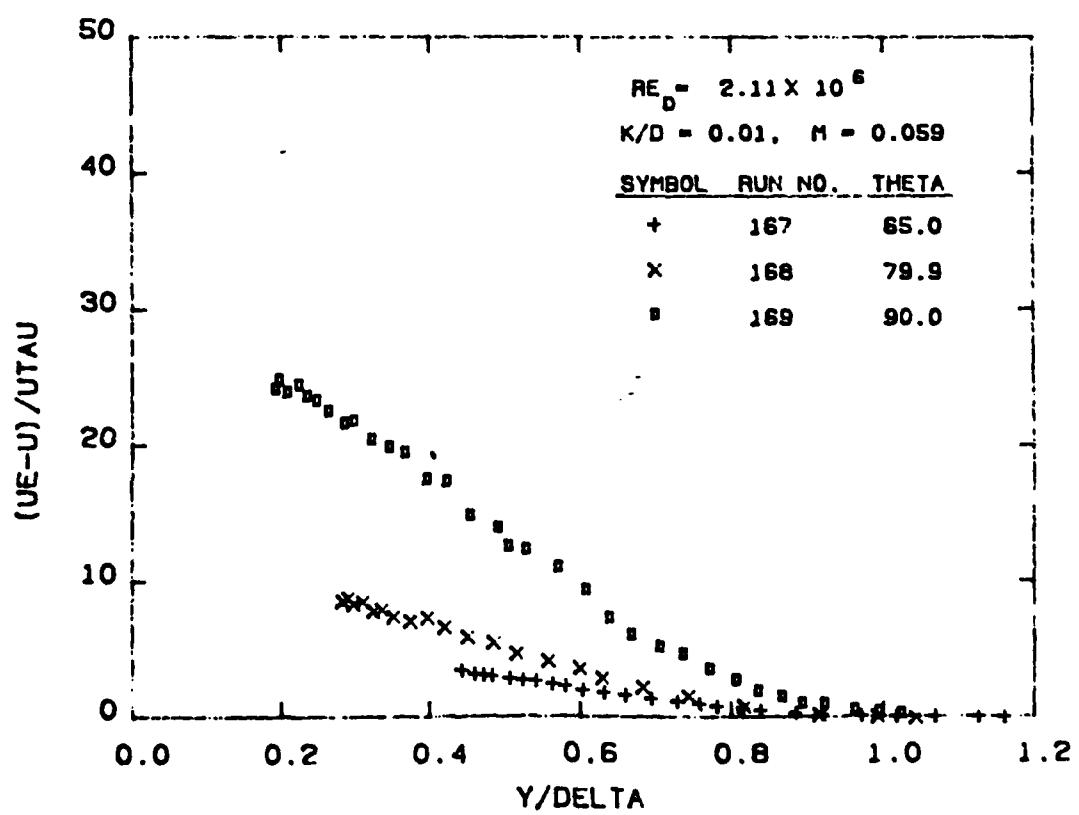
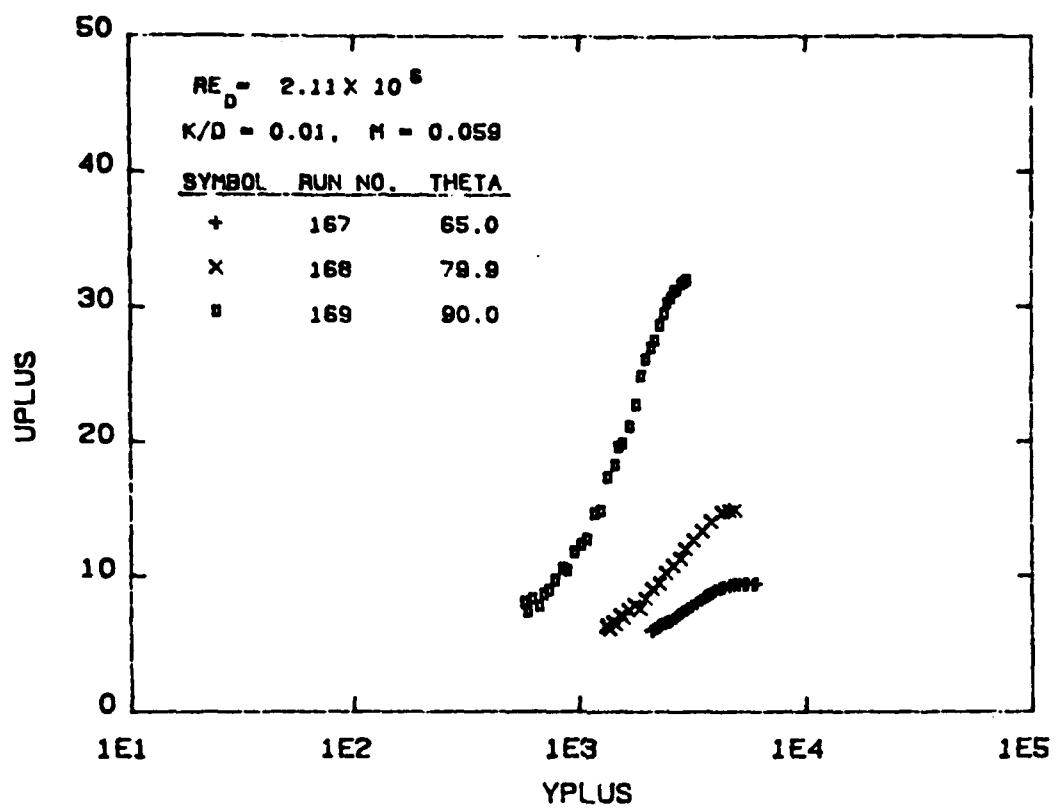
Y(CM)	U/UE	Y+	U+	Y/DELTA	UDEF
0.196	0.393	1142.55	6.976	0.305	10.773
0.199	0.421	1157.33	7.465	0.308	10.284
0.209	0.432	1216.45	7.663	0.324	10.086
0.217	0.441	1260.79	7.835	0.336	9.914
0.227	0.454	1319.91	8.060	0.352	9.688
0.234	0.468	1364.26	8.305	0.364	9.443
0.245	0.503	1423.38	8.922	0.379	9.826
0.257	0.506	1497.28	8.976	0.399	8.772
0.265	0.521	1541.62	9.244	0.411	8.505
0.273	0.546	1585.97	9.690	0.423	8.059
0.290	0.551	1689.43	9.778	0.450	7.971
0.303	0.593	1763.33	10.527	0.470	7.222
0.313	0.623	1822.46	11.059	0.486	6.690
0.336	0.650	1955.48	11.533	0.521	6.216
0.351	0.681	2044.17	12.096	0.545	5.653
0.372	0.707	2162.41	12.540	0.576	5.208
0.400	0.750	2325.00	13.306	0.620	4.443
0.415	0.785	2413.68	13.930	0.643	3.818
0.430	0.811	2502.37	14.389	0.667	3.360
0.453	0.851	2635.39	15.108	0.702	2.641
0.483	0.880	2812.76	15.626	0.750	2.123
0.506	0.909	2945.79	16.136	0.785	1.612
0.544	0.949	3167.50	16.840	0.844	0.909
0.585	0.982	3403.99	17.421	0.907	0.328
0.621	0.992	3610.92	17.606	0.962	0.143
0.648	0.997	3773.50	17.695	1.006	0.054
0.679	0.999	3950.87	17.729	1.053	0.020

## RUN 166

Y(CM)	U/UE	Y+	U+	Y/DELTA	UDEF
0.189	0.183	441.54	7.640	0.193	34.124
0.199	0.180	465.31	7.538	0.203	34.226
0.207	0.240	483.14	10.008	0.211	31.756
0.217	0.250	506.91	10.423	0.221	31.341
0.224	0.222	524.74	9.254	0.229	32.510
0.232	0.229	542.56	9.553	0.237	32.211
0.245	0.237	572.28	9.906	0.250	31.858
0.250	0.240	584.16	10.021	0.255	31.743
0.260	0.254	607.93	10.592	0.265	31.172
0.270	0.298	631.70	12.445	0.276	29.318
0.293	0.321	685.19	13.416	0.299	28.348
0.318	0.323	744.62	13.491	0.325	28.273
0.346	0.355	809.98	14.842	0.353	26.922
0.379	0.415	887.24	17.316	0.387	24.448
0.410	0.462	958.55	19.303	0.418	22.461
0.433	0.495	1012.03	20.670	0.442	21.094
0.478	0.536	1119.00	22.396	0.488	19.368
0.514	0.590	1202.20	24.646	0.525	17.118
0.554	0.652	1297.28	27.234	0.566	14.530
0.588	0.721	1374.54	30.123	0.600	11.641
0.615	0.746	1439.91	31.158	0.628	10.606
0.656	0.791	1534.99	33.038	0.670	8.726
0.679	0.798	1588.47	33.325	0.693	8.439
0.717	0.856	1677.61	35.755	0.732	6.009
0.750	0.873	1754.87	36.440	0.766	5.324
0.775	0.904	1814.29	37.737	0.792	4.027
0.806	0.922	1885.61	38.509	0.823	3.255
0.839	0.946	1962.86	39.516	0.856	2.248
0.875	0.958	2046.06	40.016	0.893	1.748
0.910	0.972	2129.25	40.598	0.929	1.165
0.953	0.983	2230.28	41.061	0.973	0.703
0.994	0.991	2325.36	41.388	1.015	0.376
1.050	0.996	2456.10	41.609	1.072	0.155
1.108	0.999	2592.78	41.736	1.131	0.028

PFI	6.500E+01	7.999E+01	9.005E+01
RUN	167	168	169
RE	2.081E+06	2.125E+06	2.102E+06
M	5.990E-02	6.040E-02	5.940E-02
K/D	1.000E-02	1.000E-02	1.000E-02
DI	2.078E+01	2.077E+01	2.042E+01
DE	3.207E+01	3.257E+01	3.038E+01
MU	3.160E-06	3.090E-06	3.070E-06
RESID	6.200E-03	1.450E-02	1.400E-02
YMIN	1.836E-01	1.887E-01	1.862E-01
YMAX	3.716E-01	4.961E-01	7.424E-01
PI	4.888E-01	1.407E+00	4.744E+00
DU*	1.861E+01	1.758E+01	1.556E+01
E+	3.400E+03	2.240E+03	9.750E+02
DELTA	4.428E-01	6.658E-01	9.610E-01
CF	5.350E-02	2.210E-02	4.300E-03
U*	3.399E+00	2.185E+00	9.470E-01
DEL*	7.460E-02	1.611E-01	3.241E-01
THETA	5.230E-02	9.000E-02	1.401E-01
N	1.428E+00	1.790E+00	2.313E+00
BTHETA	5.300E+03	9.470E+03	1.390E+04
BETA	-9.601E-02	4.078E-01	6.198E+00





## RUN 167

Y(CM)	U/UE	Y+	U+	Y/DELTA	UDEF
0.184	0.631	1975.55	5.950	0.415	3.484
0.196	0.637	2112.17	6.008	0.443	3.426
0.204	0.660	2194.14	6.228	0.461	3.205
0.209	0.672	2248.79	6.340	0.472	3.093
0.214	0.682	2303.44	6.433	0.484	3.001
0.224	0.695	2412.73	6.560	0.507	2.873
0.232	0.711	2494.71	6.705	0.524	2.729
0.240	0.720	2576.68	6.790	0.541	2.644
0.250	0.742	2685.98	7.003	0.564	2.431
0.257	0.761	2767.95	7.182	0.581	2.251
0.267	0.784	2877.25	7.399	0.604	2.035
0.280	0.807	3013.87	7.617	0.633	1.817
0.293	0.827	3150.49	7.803	0.661	1.630
0.308	0.852	3314.44	8.037	0.696	1.396
0.323	0.873	3478.38	8.240	0.730	1.194
0.336	0.897	3615.00	8.464	0.759	0.970
0.346	0.912	3724.30	8.602	0.782	0.831
0.361	0.929	3888.25	8.766	0.816	0.668
0.372	0.947	3997.54	8.931	0.839	0.502
0.392	0.965	4216.14	9.101	0.885	0.332
0.407	0.974	4380.08	9.188	0.920	0.245
0.430	0.986	4626.00	9.306	0.971	0.128
0.450	0.997	4844.60	9.405	1.017	0.028
0.473	0.998	5090.52	9.413	1.069	0.021
0.499	1.000	5363.76	9.429	1.126	0.005
0.547	1.000	5882.92	9.431	1.235	0.003

## RUN 168

Y(CM)	U/UE	Y+	U+	Y/DELTA	UDEF
0.189	0.429	1334.55	6.398	0.283	8.506
0.194	0.413	1370.47	6.159	0.291	8.746
0.199	0.445	1406.40	6.626	0.299	8.279
0.207	0.433	1460.28	6.461	0.310	8.444
0.217	0.479	1532.13	7.141	0.325	7.764
0.224	0.470	1586.01	7.000	0.337	7.905
0.234	0.506	1657.86	7.535	0.352	7.370
0.250	0.530	1765.63	7.904	0.375	7.001
0.265	0.512	1873.40	7.633	0.398	7.272
0.280	0.561	1981.17	8.358	0.421	6.547
0.300	0.607	2124.86	9.042	0.451	5.862
0.323	0.635	2286.52	9.465	0.486	5.440
0.344	0.688	2430.21	10.255	0.516	4.650
0.372	0.725	2627.79	10.810	0.558	4.095
0.400	0.761	2825.37	11.343	0.600	3.562
0.420	0.808	2969.06	12.044	0.631	2.861
0.455	0.853	3220.53	12.710	0.684	2.195
0.496	0.898	3507.91	13.378	0.745	1.527
0.544	0.948	3849.18	14.124	0.818	0.781
0.610	0.990	4316.19	14.752	0.917	0.152
0.661	0.998	4675.42	14.874	0.993	0.030

## RUN 169

Y(CM)	U/UE	Y+	U+	Y/DELTA	UDEF
0.186	0.249	574.31	7.978	0.194	24.102
0.191	0.228	589.98	7.327	0.199	24.754
0.201	0.256	621.32	8.226	0.210	23.854
0.217	0.240	668.34	7.698	0.225	24.382
0.227	0.266	699.68	8.525	0.236	23.556
0.240	0.276	738.85	8.859	0.249	23.221
0.255	0.300	785.86	9.622	0.265	22.458
0.275	0.328	848.54	10.514	0.286	21.566
0.288	0.323	887.72	10.359	0.299	21.721
0.311	0.365	958.23	11.722	0.323	20.358
0.334	0.382	1028.75	12.257	0.347	19.823
0.354	0.395	1091.43	12.672	0.368	19.409
0.382	0.457	1177.62	14.651	0.397	17.430
0.407	0.462	1255.97	14.823	0.424	17.258
0.438	0.540	1349.99	17.318	0.455	14.762
0.473	0.568	1459.68	18.209	0.492	13.871
0.486	0.610	1498.86	19.573	0.506	12.507
0.509	0.618	1569.37	19.825	0.529	12.256
0.549	0.657	1694.74	21.090	0.572	10.990
0.585	0.709	1804.43	22.734	0.609	9.347
0.615	0.774	1898.45	24.834	0.640	7.247
0.643	0.812	1984.63	26.061	0.669	6.019
0.679	0.840	2094.33	26.932	0.706	5.149
0.709	0.857	2188.35	27.489	0.738	4.592
0.742	0.891	2290.20	28.584	0.773	3.497
0.775	0.917	2392.06	29.420	0.807	2.660
0.803	0.943	2478.25	30.243	0.836	1.838
0.834	0.955	2572.27	30.623	0.868	1.457
0.859	0.970	2650.62	31.123	0.894	0.958
0.887	0.971	2736.81	31.165	0.923	0.915
0.925	0.986	2854.33	31.645	0.963	0.435
0.956	0.991	2948.35	31.777	0.995	0.304
0.984	0.995	3034.54	31.928	1.024	0.153

**END**

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